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ABSTRACT

This report represents a detailed summation of existing workforce levels, training programs, career potential, and staffing level projections through 1981 for EPA Region VII. This region serves the states of Iowa, Kansas, Missouri, and Nebraska. The specific pollution programs considered include air, noise, pesticides, potable water, radiation, solid waste, and wastewater. The content of each section is limited to the control authority which EPA possesses. The study was undertaken to provide a strategy for supporting and implementing environmental education and career training programs based on needs and growth trends evidenced by the initial workforce assessment. A selected bibliography is included for reference. (CS)

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A National Environmental/Energy Workforce Assessment

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NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

REGION VII

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

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PREFACE

This report represents a compilation of current staffing levels, training programs, and significant ongoing activities in the Region VII offices of the U.S. Environmental Protection Agency. All information, including staff projections to 1982, is based on data supplied by the program offices. Workforce projections are an aggregate of available information and the professional judgment of individuals working in the fields covered by this report: air, noise, pesticides, potable water, radiation, solid waste, and wastewater. A section on federal energy activities has been appended to this report and describes workforce and program activities in a manner similar to that of the pollution control and abatement fields. This report is designed to provide an adjunct to the four state reports (Iowa, Kansas, Missouri and Nebraska) which comprise Region VII.

FOREWORD

As has been previously pointed out, the information contained in this report has been gathered primarily from on-site interviews with Region VII EPA program offices. These interviews were supplemented by extensive correspondence and telephone conservations to ensure data reliability. However, it must be understood that making workforce projections is, at best, difficult under the best of conditions. Still, if projections are to be made, then it follows that the most reliable information will emerge from the aggregate judgment of professionals actually doing the job. In instances where judgments within a given program varied, the author took the middle ground.

This report aggregates Region VII EPA program information for the pollution control and abatement fields of air, noise, pesticides, potable water, radiation, solid waste, and wastewater along with federal energy programs as they pertain to the Region. It was not always possible nor practical to isolate program functions since operations within the various pollution control and abatement areas overlap. Further, inter-office and intra-divisional cooperative efforts frequently necessitate transfer of personnel. However, every effort was made to represent the division, branch, and office functions in a manner that will provide the reader with a grasp of the operation and function of the regional programs. The emphasis in this report has been placed on representing current staffing levels and anticipated growth/decline rates over the next five years. A more detailed

explanation of the Region VII mission and organization will be found in the Region VII Organization and Function statement appended to this report.

National Environmental Energy
Workforce Assessment

Phase I

REGION VII

Report

REGIONAL PROFILE

The geographic configuration of Region VII includes the States of Iowa, Kansas, Missouri, and Nebraska. Its major metropolitan areas are Omaha, Kansas City, Kansas/Missouri, St. Louis, and Des Moines. With the exception of Des Moines, the cities are located on the Mississippi and Missouri Rivers both of which are important to the commerce and welfare of these midwestern and other states. Billions of tons of wheat, corn, soybeans, and manufactured goods travel up and down these rivers nearly year-round.

The land itself is generally rolling plains traversed by numerous significant rivers such as the North Platte, Arkansas, Missouri, and Des Moines. The climate is temperate although extremes from below zero to days when the temperature is well over a hundred are not uncommon. Rainfall is moderate ranging from 25 to 40 inches a year.

Traditionally the Region has been populated with small towns and the economy is one given to the production of food grains and livestock. In fact, the combined four state production of corn, wheat, oats,cattle, and hogs contributes a substantial portion of the national total for these products. Manufacturing is generally confined to the Kansas City and St. Louis areas, although many lighter industries have located in Lincoln, Wichita, Topeka, Davenport, Springfield, Hannibal, and Cedar Rapids. Still, the land is the most valuable commodity with some prime farming areas selling for more than $2,500 an acre in Iowa. Moreover, farmland has become so critical that its sale for residential development has been restricted.

With the exception of the three largest metropolitan areas, pollution problems have not been severe. Efforts are underway to contain and abate the growing problems associated with pollution of the Mississippi and Missouri Rivers. The widespread use of pesticides in agriculture has been relatively well-controlled although, as usage grows, precautionary measures, including training and certification, will be intensified. Air pollution, as the industrial base grows and more vehicles travel the roads, has been a cause for concern with air alerts now becoming more than an urban phenomenon. The problem of fugitive dust is growing and it is expected that reduced fall plowing, terracing and other conservation measures will help alleviate this condition.

The future portends an increasing growth of light manufacturing, and farm production, but a reduction in the number of farm owners accompanied by a growth in farm size, growing numbers of confined feeding operations, and a relatively slow population growth as has been true in the past. These states are known for their conservatism so it is unlikely that growth in any area will be steady but carefully measured.

Organizational and Operational Structure

ORGANIZATIONAL AND OPERATIONAL STRUCTURE OF EPA - REGION VII

The Region VII offices of EPA in Kansas City, Missouri represent an extension of the primary EPA headquarters premise: to initiate, support, and implement, where practical, such activities that will protect and enhance the quality of the environment. As such, the offices are empowered to enforce those federal pollution control and abatement laws and regulations which are binding on their four-state area of jurisdiction. However, while enforcement and regulation are important activities, the Region VII offices provide equally if not more important technical assistance to the states. This assistance takes the form of supporting state agencies, local governments, and individuals with research and development, review, evaluation, planning, implementation, and management activities as they pertain to environmental protection.

In its efforts to optimize program assistance capability to the states, Region VII moved towards refinement of its internal program management system. This effort has manifested itself in a realignment of the program planning and evaluation unit in the Management Division. This unit, according to the Region VII FY-76 report, will "provide the opportunity to control all EPA resources available to the Regional Administrator." The report amplifies this position by pointing out that the unit is "dealing with program requirements in the Headquarters' Formal Planning and Reporting System (FPRS) and will also assist the four states to improve coordination and plan their environmental

programs." This effort was actualized during the third quarter of FY-76 when a review and evaluation report was issued which included external and internal program activities. As a consequence, the FY-76 report concludes, all EPA resources were felt, for the first time, to be directed towards improving environmental quality. The resources given to Regional Office functions, then, when combined with state/local resources can be used to estimate accurately the workforce needs of state/local agencies for a given activity. In this way, the delegation of more and more program responsibility, as mandated by federal legislation, can be carried out realistically.

Regional program officers are generally satisfied with the performance of their MBO system. Indications are that most programs were on schedule, although some milestones, due to a need for appropriate state legislation, were not met or were constrained. In a few cases, program priorities shifted and output commitments became less significant.

The Region VII FY-76 report shows that the most prominent successes were in the construction grants program. Its progress has placed Region VII second in the nation with regard to total awards made. Along with the foregoing, the NPDES program enjoyed considerable progress in that more than 80 percent compliance for municipal and 85 percent for non-municipal dischargers was maintained.

Although Region VII officials have indicated an overall satisfaction with achieving EPA goals, there is still considerable concern about the inability of the respective states to keep pace with federal environmental legislation. This situation is usually the consequence of limited fiscal capability at the state level. However, the

states are occasionally unwilling to assume delegable authority according to federal guidelines which has detracted from achieving optimum success. In some instances, the states wish to come into compliance at their own pace. There is also concern at the state level that the regional office is more interested in meeting internal output goals than assisting states with their unique problems. Conscious of this situation, Region VII is working to maintain its posture with regard to its role as a regulatory agency and at the same time intensifying its efforts to assist the states in achieving their environmental goals. Quite simply, the disparity between state and federal program goals and their respective aspirations for protecting and enhancing the environment still exists. However, cooperative efforts have shown a steady increase and Region VII program officers are confident that expanding efforts by the Regional Office to act in an advisory capacity as well as a regulatory agency will serve to augment state/federal cooperation.

Region VII activities are under the direction of the Regional Administrator and the Deputy Regional Administrator. This office is responsible for execution of federal regional programs and such other activities as may be assigned by EPA headquarters. The Office of the Regional Administrator has several components. The Office of Public Affairs advised the Regional Administrator and Division Directors on Agency programs. The office also represents the Administrator and EPA with the media and assures that appropriate responses are made to inquiries. The Intermedia Programs Office, unique in the EPA regional structure, is responsible for four programs: Manpower and Training,

Environmental Impact Statement, Research and Development, and Federal Activities. The Office of Regional Counsel advises the Regional Administrator on all legal matters which concern the management of the regional office. A congressional and intergovernmental affairs officer is also attached to the Regional Administrator's Office and serves to advise the Regional Administrator on congressional matters and agency activities within the federal governmental structure.

The Region VII offices are further subdivided into five divisions which are responsible for program activities in the major pollution control and abatement areas (a complete delineation of functions is appended to this report):

1) Air and Hazardous Materials Division: The Division serves as regional technical authority for interpreting federal standards and regulations for the regional air, pesticides, waste management, radiation, toxic substances, and noise abatement and control programs.

2) Enforcement Division: The Division selects strategies and techniques for achieving compliance. It provides guidance to the Water Division, the Air and Hazardous Materials Division, and the Surveillance and Analysis Division regarding data necessary to determining compliance status and for supporting enforcement actions and determines the need for corrective action based on information received from agency and non-agency sources.

3) Management Division: The Division consolidates and coordinates all regional office programs and state planning, output reporting and serves as the initial contact point for EPA interaction in these matters with state and local agencies.

4) Surveillance and Analysis Division: The Division collects, analyzes, and evaluates environmental quality data to support regional and national monitoring requirements for all environmental programs and for enforcement activities.

5) Water Division: The Division recommends to the Regional Administrator, goals, priorities, and objectives for the regional water programs. It is responsible for the development, coordination, implementation, and evaluation of these programs. It further assists the states in developing comprehensive programs, including implementation plans for achieving water quality standards.

The current staffing configuration for the Region VII offices is depicted below. The figures are taken from a July, 1976 regional computer printout and have been broken down into four specific areas.

STAFFING LEVEL FIGURES FOR U.S. EPA REGION VII

Position	1976	Anticipated %/annum growth to 1982 (av.)
Administrative	31	5%
Professional	136	5-10%
Technical	34	10%
Clerical	87	10%
TOTAL	288	

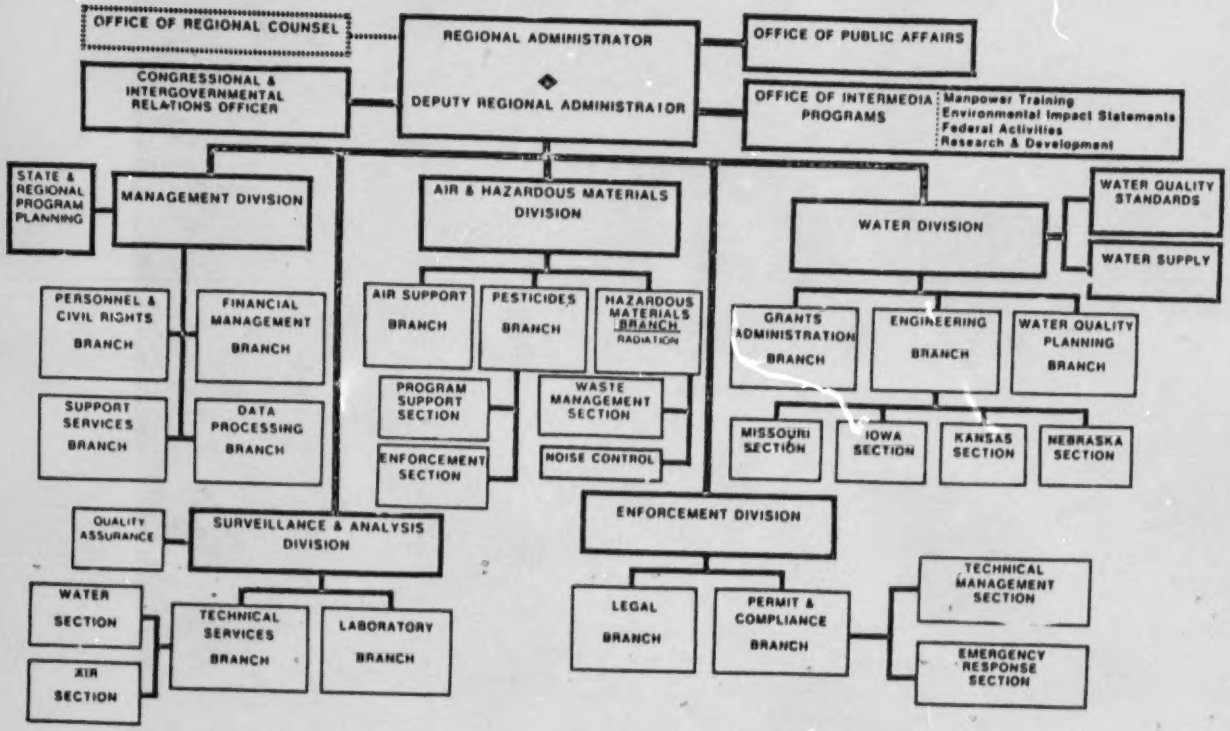
The foregoing total does not include either summer or student aides enumerated by the printout. As of August, 1976 there were 21 student aides, among them four physical science aides. The others represented backgrounds in engineering and the sciences.

In categorizing the overall regional office staffing figures, it should be pointed out that some discrepancy existed between actual function, job title, and background training. Further, job titles are subject to change to fit shifting or new position responsibilities, thus the computer representation is liable to contain a certain margin of error. In addition, the projected growth rates represent the best professional judgment of program officers. Wherever

possible these projections reflect anticipated growth based on what might be termed normal conditions, which is to say, that these rates do not consider extraordinary legislation or unusual shifts in funding patterns.

Figure 1

ORGANIZATION CHART
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION VII



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Regional Pollution Control and Abatement Programs

I. AIR

A. Workforce Profile

The responsibility for air pollution control activities rests with the Surveillance and Analysis Division and the Support Division. The Air Support Branch of the Air and Hazardous Materials Division is involved in a wide spectrum of activities as they pertain to air pollution control and abatement; the Clean Air Act and its 1970 amendments are its primary operational authority. More specifically, the Branch develops and revises State Implementation Plans (SIP), monitors new Source Performance Standards (NSPS), reviews and coordinates the activities of the Energy Supply and Environmental Coordination Act (ESECA), and coordinates emergency episode activities with Surveillance and Analysis field staff. The Branch is also responsible for assisting the states in meeting compliance standards as well as developing Transportation Control Plans (TCP), e.g., St. Louis. Branch staff further provide technical assistance to state and local air programs.

As outlined in the Region VII Organizations and Functions, the Enforcement Division also carries out enforcement activities in support of the regional air pollution control programs. Primarily, the Division recommends and initiates enforcement actions regarding the Clean Air Act, Amendments of 1970. It prepares warning letters and complaints for violations of unleaded gasoline. In FY 1976 more than

4,000 gasoline samples were tested. Although no notices of contamination were issued, 136 penalties -- generally for administrative or availability violations -- were issued. A total of 1,968 violations were dedtected. The Division also represents the Region in all civil hearings, prepares materials for litigation, and assists is court trials. It coordinates air surveillance with the Surveillance and Analysis Division and develops compliance schedules for sources subject to federal regulations and SIPs. Division staff review state compliance schedules negotiated with industries as well as applications from industries regarding compliance with National Emission Standards for Hazardous Air Pollution Sources (NESHAPS), evaluate present and proposed equipment, and recommend issuance of waivers of testing and compliance.

The air section of the Surveillance and Analysis Division supports the other air programs and is responsible for performing three types of source compliance inspections: 1) inspection of existing stationary sources to determine compliance with SIP; 2) inspection of new or hazardous material sources as they pertain to federal standards; and 3) inspection of service stations to determine availability of no-lead gasoline. This section is also responsible for operation of the National Air Surveillance Network and evaluation of all local and state networks.

Regional sources indicate that state activities included meeting the 1976 commitment for final compliance of major point sources.

There are 1,793 known sources in the Region and 84 percent are in final compliance; an additional 9 percent are in compliance with schedules. This is a total of 93 percent of 1,667 sources in compliance or a 14 percent increase since the end of Fiscal Year 1975. In addition, there are 13 major air point sources at federal facilities in Region VII. All 13 are either in compliance with SIP or on a consent declaration according to the Region VII FY-76 report.

In the illustrations following, the current staffing levels for the Region VII air pollution control programs have been depicted. It should be noted that, in addition to the assistance provided by the Surveillance and Analysis and Enforcement Divisions, the Air Support Branch receives administrative support of the Regional Administrator's office as do the other pollution control programs. The largest professional group is represented by engineers followed by scientists and attorneys.

TABLE I

Current (1976) Region VII
Air Pollution Control
Staffing Level

AIR AND HAZARDOUS MATERIALS DIVISION
AIR SUPPORT BRANCH

Position	1976
Engineer	6
Scientist	3
Other	2
TOTAL	11

SURVEILLANCE AND ANALYSIS DIVISION
AIR SECTION

Position	1976
Engineer	6
Scientist	1
Technician	3
Other	3
TOTAL	13

ENFORCEMENT DIVISION
AIR PROGRAMS

Position	1976
Engineer	2
Attorney	1
Other	7
TOTAL	10

In sum, there are 34 people devoting their efforts to air pollution control activities in the Region VII offices. Of this total, 14 are engineers (civil, sanitary, mechanical, public health service), 4 are scientists (chemist, meteorologist, environmentalist), 3 are technicians (engineering, physical scientist, environmental protection), one is an attorney, and 12 have been classified as other. This latter category includes secretaries, paralegal, and clerks. The specific air program staffing configuration represents about 12 percent of total regional complement of 288.

B. Workforce Projections

No inordinate growth is anticipated for the air programs, although more stringent enforcement legislation and higher air quality demands by the public could occasion additional positions. Passage of new Clean Air Act amendments, for instance, would affect regional enforcement activities, but the greatest growth would come at the state and local levels. Given existing conditions, that being more than 90 percent of the known sources in the Region already in or on schedule to attain compliance, regional office growth is expected to be no more than 9 to 12 percent for the professional and technical fields. The turnover rate will be in the area of 5 percent. The regional monitoring, sampling and enforcement activities will continue with little change, but planning strategies for attaining better quality standards may require a shift in program emphasis and responsibility.

The following table represents the judgement of program officers regarding the growth pattern of the Air Support Branch. The workforce projections for the other divisions having air programs have been factored into this table since their growth patterns will likely be similar to that of the Branch.

TABLE II

Region VII
Workforce Projections to 1982 (est.)
for Air Pollution Control

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	14	16	16	18	19	21	n/a	9%
Scientist	4	6	7	8	9	9	n/a	19%
Technician	3	4	4	6	6	7	n/a	20%
Other	13	14	14	15	17	19	n/a	8%
TOTAL	34	40	41	47	51	56		10%

The scientist and technician categories tend to skew the growth pattern since even a minimal personnel growth may reflect a substantial percentage growth, e.g., 1977. However, the average of the total air program growth reflects what might be termed a realistic view of anticipated growth for the three programs. This annual average per annum growth may fluctuate by as much as three points depending on the position to which incoming staff may be assigned, particularly in the Surveillance and Analysis and Enforcement divisions where job duties may not be full-time air positions.

C. Training and Certification

Program staff provide informal OJT programs for new staff members, and all staff members may take part in the courses sponsored by EPA through its Air Pollution Training Institute (APTI). Courses range from the very general, Principles and Practice of Air Pollution Control, to more complex courses in Combustion Evaluation and Statistical Evaluation. From July, 1976 through June, 1977, EPA offered the following courses in Kansas City. These courses require a tuition fee and may be attended by both the public and private sector.

Course	Length (days)
Atmospheric Sampling	4
Principles and Practice of Air Pollution Control	4½
Combustion Evaluation	5
Air Pollution Control Technology	4
Statistical Evaluation of Air Pollution Data	4

The institute will award Continuing Education Units (CEUs) for successful completion of its courses. One CEU will be awarded for each 10 hours of participation in a given course. Courses in management and administration are also available through the Civil Service Commission as are executive seminars sponsored by U.S. EPA. Staff are also encouraged to continue their formal education by utilizing the surrounding education facilities.

In addition to the considerable, ongoing technical assistance effort by the Region, a number of formal courses and seminars were offered to the states in 1976. The following lists those courses and the number of attendees. These courses were generally three days in length.

Course	Attendees
Control of Gaseous Emissions	27
Control of Particulate Emissions	28
Evaluation of Stationary Source Performance Testing (2 courses)	60
TOTAL	105

While the preceding represents what might be termed a "good turnout" for the courses, reduced national sponsorship of training activities and user charges (tuition) for the courses have curtailed attendance by local and state officials. Conversely, this creates a problem at regional headquarters in that their program structure has neither the budget nor the people to offset the impact of current national training policies. As a consequence, regional administrators find themselves confronted with more responsibility without the luxury of an expanded resource base.

D. Career Potential

No substantial growth is expected for the Region VII air programs effort over the next five years. The greatest growth will be in the engineering field with some emphasis on combustion specialities. There will be some increased need for planners and data analysts; however, no new or unique career fields are expected to emerge. The future is more likely to require expanding responsibilities on the part of existing staff. New technology will require, in some instances, upgrade or cross-training and new, more stringent legislation may require staff growth beyond expectations.

E. Conclusion

The situation in air pollution control for Region VII is generally one which presents no urgent needs. The states are well on their way to meeting national standards, there are no major dischargers which have either not achieved or are on schedule to achieve compliance. Program officers anticipate only minimal growth to keep pace with turnover (5-10%) and current regulations. Planning and data analysis skills may require some growth and, of course, new legislation may demand increased program activity. Still, without increased budget, new legislation will only mean that the current program effort will be spread thinner.

II. NOISE

A. Workforce Profile

The Region VII noise program takes its authority from the Noise Control Act of 1972. At present, the program is housed in the noise office of the Hazardous Materials Branch of the Air and Hazardous Materials Division. Primarily, the office is engaged in recommending and planning approved programs for the states in the region. The office also provides technical assistance to state and local agencies for formulation of ordinances and regulations as may be required by federal law and agency policy. Other activities include review of Environmental Impact Statements (EIS) for compliance with noise regulation, answering noise complaints, and giving testimony before state and local governmental bodies. The noise program may further include noise surveys, selected monitoring, and conducting public relations activities around the region. However, current program efforts are curtailed due to limited staff resources which is to say that the office is now staffed by a single mechanical engineer.

B. Workforce Projections

Since there is only limited specific noise legislation and even more limited funding, Region VII sources suggest only some small growth for the noise program over the next five years (1982). The addition of an engineer and a scientist has been projected for 1978 and 1979 respectively. However, more stringent legislation at the federal, state, and local levels could significantly alter staffing

levels. Alteration of allowable community noise levels could also bring about staff growth. National quiet cities and quiet neighborhoods programs would further serve to expand noise efforts. Program staff might be involved in noise surveys, assessments, enforcement activities, ordinance development, and community education efforts. Specific areas of concern would include construction noise, boundary line emissions, planning, and highway noise. A major effort of endeavor would concentrate on airport noise and abatement plans such as might be implemented, modified, and enforced in St. Louis and Kansas City. Still, much of the foregoing is in the realm of the speculative where added staff positions are concerned; thus, accurate projections are impossible to make.

C. Training and Certification

In-house staff may take part in EPA sponsored manager's programs and the occasional other seminars relating to legislation, enforcement, and planning. Adding program staff would require OJT types of training, and it would take the form of informal one-to-one training with a practicing professional. Training courses are available through local colleges, universities, and equipment manufacturers. Such courses are in the areas of instrumentation, design, physics, and acoustics. However, since the field is still small seeking advanced training or developing unique noise skills may not be required or even necessary.

Because of limited staff capability and the relative lack of resources for noise programs in cities, the technical assistance and

programs available to the Region VII states have been limited. Staff are available to answer questions concerning legislation and enforcement and they will, by request, assist with municipal and local matters, including drafting ordinances. The Region has sponsored community noise sorkshops in Des Moines, Iowa, St. Louis, Missouri, and Omaha, Nebraska, which were attended by an average of 50 persons each.

D. Career Potential

Currently, career opportunities in the noise field are quite limited. The immediate future may require new combinations of engineering skills with emphasis in product/structure design and acoustics, but no new or unique careers are anticipated. A cadre of individuals trained in instrumentation may be required at the local level for enforcement activities, but these people would likely use these skills in the performance of their regular jobs, e.g., law enforcement. At the career level, emphasis will continue to be given to the physics and engineering disciplines.

E. Conclusion

A fitting summary for the noise field might be found in the words of an engineer in the field who asserted that since no one had yet died of noise, program development and its consequent career opportunities would be limited. There will continue to be positions in industry for design engineers and scientists with backgrounds in acoustics and physics, but these positions will be few and their noise activities may be in conjunction with other duties. Airport, highway,

and urban/suburban noise will become matters of increasing concern, yet it will take public awareness and their commensurate concern for lowering noise levels before programs will expand. Very likely, problems will be resolved at the state and local levels with increasing resources. As a consequence, noise control and abatement career opportunities are anticipated to develop slowly, although significant, definitive legislation could rapidly alter future needs.

III. PESTICIDES

A. Workforce Profile

The Region VII Pesticides Program Branch is within the Air and Hazardous Materials Division. It is responsible for planning, recommending, and implementing an approved regional program as set forth by Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and its subsequent amendments.

According to the regional Organization and Functions document, the Branch operates in two sections. The Program Support Section is directly responsible for planning, conducting, and providing technical support activities as authorized by FIFRA. This Section is particularly active with state agencies in developing needed legislation and program plans for training and certification of pesticide operators. The Section also investigates pesticide accidents and incidents and recommends courses of action for development and operation of appropriate safety programs.

The Support Section further coordinates the regional monitoring system and develops and maintains the pest-alert system and the State Pesticides Profiles Program. The staff also maintain an information file on new pesticides, control approaches, and changing use patterns. Additional Section activities include advice on disposal, assist with case development, and monitoring federal grants.

The Enforcement Section is responsible for conducting enforcement activities as they pertain to regulating production, shipment, sales, and application of pesticides under FIFRA. In line with this

responsibility, the Section conducts field inspections with producers, gathers samples, and investigates uses/misuses of pesticides.

Evaluation of pesticide information is a further and important function of the enforcement Section. Among these activities are actions for stop-sales, re-calls, seizures, civil/criminal complaints, and notice of warning. The Section also evaluates and maintains storage of Pesticide Producer Establishment Registration and Producer Reports as well as monitors Experimental Permits.

Like the Air Support Branch, the Pesticides Branch is assisted in its mission by the Surveillance and Analysis and the Enforcement Divisions. Program staff in these divisions carry out activities which support FIFRA and the 1972 Amendments. The Laboratory Branch also provides considerable data analysis to the pesticides branch.

Under the new Toxic Substances Control Act of 1976, the toxic substances program within the Branch is expected to grow from a single scientist to a staff of ten. This will be discussed in greater detail in the following section. The new solid waste act will also have program implications for the Branch regarding the disposal of pesticides and their containers.

Currently the Branch has a staff of seventeen. With the exception of a case development technician and clerical positions, the Program is staffed with consumer safety officers and a scientific director all of whom have four-year or advanced degrees, and/or extensive experience in the sciences, e.g., biology, entomology, chemistry. The branch also has an attorney who is attached to the Enforcement Division. The following table illustrates the preceding staffing configurations.

TABLE III

Current (1976) Region VII
Air and Hazardous Materials Division
Pesticides Branch

Staffing Level

Position	1976
Scientist	11
Technician	1
Attorney	1
Other	4
TOTAL	17

B. Workforce Projections

As has been previously mentioned, the provisions of the Toxic Substances Control Act of 1976 could occasion substantial growth in the Toxic Substances Program within the Branch. During 1977-1978, growth would reflect staff necessary for carrying out enforcement and monitoring activities and planning and development activities. Thereafter the Program would stabilize, although responsibilities would shift and broaden. Percent growth rates have not been included since the growth is rapid and represents small numbers of positions.

TABLE IV
Region VII
Workforce Projection to 1982 (est.) for
Air and Hazardous Materials Division
Toxic Substances Program

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Scientist	1	3	5	5	5	5	n/a*
Attorney	0	0	1	1	1	1	n/a
Other	0	3	4	4	4	4	n/a
TOTAL	1	6	10	10	10	10	n/a

*not applicable

For the Branch itself, program officers indicate the addition only of a scientist, a technician, and one or two clerical positions. However, carrying out the provisions of the Toxic Substances Control Act could well double the size of the existing Branch staff, exclusive of the Toxic Substances program. Staff turnover during this period is expected to remain low, probably in the 5 to 10 percent range. Other factors which would influence staff growth include headquarter's delegation of pesticides registrations to the Region. Product proliferation will doubtless impact the staff complement, though it may mean only added responsibility. Field inspection responsibilities will also increase commensurate with state implementation programs.

Finally, Region VII sources point out that an enormous amount of work in pesticides classification, registration, and re-registration of product and operator/applicator certification is yet to be done. If the states are to achieve compliance with the provisions of FIFRA for 1977, these same sources further point out that the federal government will have to fund regional program activities to the extent necessary for achieving compliance. Were federal funding adequate, then the regional programs would be able to provide the technical assistance where in-state resources were not available or legislatures did not allocate funds for state pesticide programs. Given appropriate funding, then, the Region VII pesticides program staff could be expected to grow substantially. If necessary funding does not become available to the Region, Branch responsibility will increase while its capability will remain static.

C. Training and Certification

Training for in-house staff is carried out informally on a one-to-one basis. The new entrant is assigned to a position and works with an experienced professional. In this regard, a new member may well spend three months in the field working on inspections. Like the other program areas, staff may take part in training courses sponsored by EPA and specific pesticides programs offered by the Department of Agriculture, the Food and Drug Administration and, the Association of Federal Investigators.

The Branch offers training to the state lead agencies via seminars and conferences. One such program was a three-day workshop which provided training for 16 pesticide inspectors. Branch staff are also available to assist the states in planning and implementing the aforementioned activities as well as other federal agencies which are involved in pesticide activities, e.g., Department of Agriculture.

The Branch may also provide direct training to state regulatory agencies when a state receives training grants under FIFRA. Under an enforcement agreement, the Branch has trained inspectors in Iowa and in Nebraska and anticipates doing so in Missouri and Kansas in the near future. This training varies according to need and may range from three to five days in duration, encompassing classroom and field activities. The Branch would like to provide more technical assistance, including necessary training, but budgetary limitations curtail their activities. The training which needs to be done is that which would bring all states up to a level of sophistication where the Branch could devote more effort to enforcement and regulation activities necessary

for assuring that states comply with federal legislation. In other words, so long as the states lag behind in meeting federal mandates, the regional office will be obliged to "span the breech" until necessary state legislation is enacted.

D. Career Potential

Realization of the provisions of the Toxic Substances Control Act would offer a number of positions in the Pesticides Branch. These positions would be for individuals with backgrounds in the sciences and agriculture, with emphasis on laboratory skills associated with chemistry and biology. Integrated Pest Management (IPM) practices could also bring about staff growth for those with broad based science backgrounds; however, funding IPM at the regional level does not appear likely in the near future. The future will doubtless bring positions for laboratory research and analysis, as the number of different and potentially dangerous products proliferates almost daily. Again, these positions will be primarily for degreed people. Technical positions, in view of the above, would occur in the laboratories and in the field for registration and enforcement activities.

E. Conclusion

While limited staff growth is expected for the Branch, its responsibilities are expected to outstrip its capabilities for several reasons: 1) The states are not able to keep pace with FIFRA requirements; 2) budget restrictions curtail field activities; 3) the states resent too much federal intervention; 4) there are too many products for which

the hazards are not known; and, 5) there are too many people selling and applying pesticides who need training. The Toxic Substances Control Act and the Resource Conservation and Recovery Act of 1976 will further extend Branch resources as would new Clean Air Act amendments and hazardous materials legislation.

Sources in the Branch suggest that despite problems, such as those above, there is generally a cooperative attitude towards program objectives at the state level and progress towards meeting FIFRA guidelines is evident. Some areas, such as Section 5F (Experimental Use Permits), are doubtful as to status. The consensus is that the states will realize that they can easily benefit from its precepts. Certification remains a top priority for the Branch and whether the states will meet the deadline depends on the speed with which their legislators act.

The accident control program of the Branch is receiving adequate cooperation from the states where reporting incidents are concerned. Missouri continues to have a full-time employee to monitor accidents and develop safety activities. In Fiscal Year 1977, the Branch anticipates reporting significant pesticide activities through the Regional MBO system. These activities will be related to disposal, public education, and product safety.

In the Federal State Cooperative Enforcement Program, the Branch expects to establish agreements between the Iowa and Nebraska Departments of Agriculture. The agreements will cover producer establishment inspection, use/misuse investigations and marketplace surveillance.

The Enforcement Section, with regard to industry compliance with registration, will carry out fewer inspections than for the previous

year due to a reduction in complement. However, the section will make every effort to maintain the same constant level of marketplace inspections as last year (1976). Fiscal Year 1976 was the first year the enforcement section emphasized use investigations. This effort revealed a significant number of misuses and, as a consequence, the section will attempt to complete a similar number of investigations this year.

IV. POTABLE WATER

A. Workforce Profile

The Region VII Water Supply Program is housed in offices of the Water Division. This Program is charged with assuring that the four states under its purview will meet the mandates of federal legislation and, specifically, the regulations of the Safe Drinking Water Act. Acting in a supervisory and advisory capacity, the Program is geared to reviewing and evaluating state plans, providing technical assistance in the areas of water supply inventories, resource planning, and pollution control activities as they impact community water supplies. Program staff are also responsible for planning and directing activities pertaining to regulation and certification of all interstate carrier water supplies in the region. As regulations governing underground injection of wastes are promulgated, the staff will provide informational seminars and training for operators and other water supply officials.

The most serious problem confronting the Water Supply Program staff is the fact that only Nebraska has yet assumed primacy for the Safe Drinking Water Act. Officials in Kansas and Missouri are hopeful that their 1977 legislatures will pass the necessary legislation. Iowa has passed a law and is expected to ask for primacy in 1977. If the other three states do not achieve primacy, regional program staff must develop contingency plans to administer the tenets of the Act.

Regional Program responsibilities are further compounded by the fact that State Water Quality Laboratories must be certified to qualify the state environmental agencies to administer the program. This activity will necessitate allocating personnel to assure completion of the certification activity. If completing the activity becomes an immediate priority, then the current staff complement will require additional personnel.

Considering the scope of the water supply program charge, the current staffing configurations appear to be at a minimal level. However, this condition, along with assumption of additional tasks dictated by the Act and the, as yet, failure of the states to accept primacy, will doubtless bring about staff growth (re: Workforce Projections). The table below, then, depicts the current situation.

TABLE V

Current (1976) Region VII

Potable Water Supply Program
Staffing Level

Position	1976
Engineer	6
Technician	1
Other	1
TOTAL	8

B. Workforce Projections

Substantial growth in the Water Supply Program is anticipated to take place during 1977 and 1978. This projection is premised on the surveillance of 4,110 community public water supplies through 1977 and the

addition of an estimated 13,000 non-public water supplies after 1978 and derived from EPA's Manual for the Evaluation of a State Drinking Water Program. It is assumed by regional sources that the bulk of non-public supplies can be managed by sanitarians. After this mid-term growth, the Program staff level should remain constant through 1981. Following the ensuing table, which illustrates the regional office growth patterns, are tables depicting the regional projections for individual state programs to implement PL 93-523, the Safe Drinking Water Act.

TABLE VI

Region VII
Workforce Projections to 1982 (est.) for
Potable Water Supply Program

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%annum growth (average)
Engineer	6	8	10	12	14	14	10	19%
Scientist	0	0	2	2	2	2	10	n/a
Technician	1	0	0	0	0	0	10	n/a
Attorney	0	1	1	1	1	1	10	n/a
Other	1	1	2	2	3	3	10	n/a
TOTAL	8	10	15	17	20	20		n/a

The preceding table illustrates that the most evident growth will be for the engineering group (19%). Two scientists will be added in 1978 and that category is expected to sustain no further growth. A technician will be lost and an attorney added. The "Other" category represents clerical and will grow commensurate with reporting responsibilities.

As indicated previously, the next four tables describe the regional estimates based on national research figures for the respective state programs relative to implementation of the Act. (It should be pointed

out that where fractions were involved, figures were rounded to the nearest whole).

TABLE VII

IOWA[1]

Workforce Projections for Potable Water to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981
Engineer	5	15	16	18	18	18
Scientist	2	11	13	15	15	15
Technician	9	32	36	41	41	41
Attorney	1	1	1	2	2	2
Other*	3	15	16	16	16	16
TOTAL	20	74	81	92	92	92

*Administrators
[1]Based on 1,250 community water supplies and 2,000 non-community water supplies.

TABLE VIII

KANSAS[1]

Workforce Projections for Potable Water to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981
Engineer	17	17	20	22	22	22
Scientist	6	6	7	8	8	8
Technician	16	16	20	24	24	24
Attorney	1	1	2	2	2	2
Other*	4	4	5	6	6	6
TOTAL	44	44	54	62	62	62

*Administrators
[1]Based on 900 community water supplies and 2,500 non-community water supplies.

TABLE IX

MISSOURI[1]

Workforce Projections for Potable Water to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981
Engineer	23	25	29	34	34	34
Scientist	4	5	6	7	7	7
Technician	24	26	30	36	36	36
Attorney	1	1	2	2	2	2
Other*	5	5	6	7	7	7
TOTAL	57	62	73	86	86	86

*Administration
[1]Based on 1,300 community water systems and 3,000 non-community water systems.

TABLE X

NEBRASKA[1]

Workforce Projections for Potable Water to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981
Engineer	3	7	9	11	11	11
Scientist	2	6	7	8	8	8
Technician	2	17	20	23	23	23
Attorney	0	1	1	1	1	1
Other*	1	6	11	12	12	12
TOTAL	8	37	48	55	55	55

*Administrator
[1]Based on 661 community water systems and 1,500 non-community water systems.

The preceding illustrations reflect some rather startling figures. For instance, if it may be assumed that the states will achieve primacy, Iowa's Program staff will expand from 20 to 92 people, or more than 400 percent. Kansas will add 18 positions, Missouri will add 29, and Nebraska will add 42, which is nearly a 600 percent growth rate. Of course, these estimates are based on what staffing levels are deemed to be reasonable and practical for implementing the laws, but the question must be asked: Can these states be expected to allocate monies to fill these positions? The answer is: likely not. The upshot of this situation is that the regional programs will have to be supported to the extent and duration that these states, particularly Iowa and Nebraska, can come up to speed for meeting regulatory guidelines.

As a consequence of the foregoing, then, the projected regional office growth from 8 to 20 may well be erroneous by 50 percent or more. However, this certainly does not suggest that regional workforce estimates are askew, only that they assume state primacy for the Act. Based on information developed from the accompanying state reports, it is more than probable that the federal effort will have to play a significant role in achieving and maintaining quality drinking water supplies.

C. Training and Certification

New water supply staff members receive the majority of their position training from their on-line counterparts. They do, of course, take part in familiarization activities, and they are encouraged to take part in courses and programs offered by EPA headquarters or those other

federal agencies offering job-related courses, training seminars or workshops. Employees may also enroll in courses and programs at local educational institutions. There are also graduate stipends and scholarships available to them through EPA.

In terms of training programs offered to the states which augment the ongoing technical assistance, the water supply program has offered the following in the past year:

Fluoridation Workshops	Total Attendance
Kansas: Three one-day sessions	120
Missouri: One two-day session	30
Safe Drinking Water Act	
Missouri: Four one-day presentations	80

The preceding are supplemented by the regularly schedlued EPA national courses and seminars. However, the number of courses suggests that if the program had the resources, it would offer at least the above short-courses more frequently in all four states. Certainly training for implementing the upcoming underground injection regulations will be necessary, and it is likely that this training will commence this year (1977).

D. Career Potential

The regional water supply program will add a number of engineers and a few scientists over the five-year period. These positions will likely be filled by individuals with backgrounds in engineering, e.g., civil,

sanitary, and in the biological sciences. No new careers are expected to develop, and the real potential appears to be in the states if they achieve primacy. Conversely, at the state level, assuming primacy is achieved, a moderate number of positions for sanitarians and technicians trained in monitoring and analysis techniques should develop.

E. Conclusion

Assuming that the four states of Region VII develop and maintain water supply programs which not only assure the citizenry of safe drinking water but meet the guidelines set forth by the Safe Drinking Water Act are the operating principles of the water supply program.

At the present time, its most critical priority is to implement the provision of the Act. To this end, the staffing configuration is projected to expand by twelve positions, the majority of which will be engineers. However, if the states do not achieve primacy or refuse it, then the burden for meeting the mandates of the Act will continue to rest with the regional program. As a consequence, staff growth could be considerably greater than anticipated.

V. RADIATION

A. Workforce Profile

The Region VII radiation office is a component of the Hazardous Materials Branch of the Air and Hazardous Materials Divison. Among its responsibilities is ensuring that radioactive materials being used at nuclear facilities will pose no threat to the environment. The mechanisms employed by Region VII to ensure control of radioactive substances include provision of technical assistance to state and local authorities, monitoring federal facilities, study of naturally occurring radioactivity, and emergency planning for nuclear facilities. The program outputs for the office in 1976 were as follows (although changing state priorities limited completion and testing of acceptable state plans):

1) Completion of the final EIS review for the Wolf Creek (Kansas) Generating Station;

2) Performance of environmental reviews of radiological aspects of selected federal activities;

3) Implementation of radiological portion of EPA Drinking Water Standards.

The activities of the office are not limited to the foregoing; however, the current staff of a director (veterinarian) and an engineer limit its outreach capability.

B. Workforce Projections

It is anticipated that the continual energy shortages will prompt widening use of nuclear sources. As a consequence, the office anticipates adding a radiation professional in late 1976. This individual will

be reviewing the radiation components of EIS. Subsequent growth in the office is reflected below. (Again, it is to be understood that these figures are based on professional estimates.)

TABLE XI

Region VII
Workforce Projections to 1982 (est.) for
Air and Hazardous Materials Division
(Radiation Control Office)

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Engineer	1	1	1	1	1	1	n/a
Scientist	1	1	1	2	2	2	n/a
Other	1	1	1	1	1	1	n/a
TOTAL	3	3	3	4	4	4	n/a

By 1979, the staff will have grown to four highly-trained and experienced professionals (engineers, scientists). Thereafter, no growth is anticipated, although turnovers would be replaced. At present, the turnover rate is less than 10 percent.

C. Training and Certification

Given low turnover and limited growth, the need for in-house training is minimal. New entrants will, in many cases, be overqualified in terms of training and experience for the positions which will develop in the regional office. If training is needed, it will be an informal experience with an on-line professional. Usual job and agency orientation is required and enrichment experiences are occasionally available from headquarters-sponsored programs. Local colleges and the university system generally offer courses and programs in which staff may enroll.

D. Career Potential

In the regional office, job opportunities are limited. It is expected that one or two openings will develop over the next five years. These jobs will be for highly trained individuals with engineering and science (physics, radiation) backgrounds. Responsibility for control and abatement of radiation pollution will become increasingly a state and local function. And, it will be at these levels where positions will emerge as the use, disposal, and transportation of radioactive materials expand. Considerable training in the sciences and instrumentation will still be necessary, and a four-year or advanced degree will be a requirement. Further, job openings for individuals in health and allied professions, with emphasis in radiation areas, will become a growing career option. The key to career potential in radiation fields will be a function of how much emphasis is placed on using radioactive materials in the future to maintain the lifestyle aspirations of the public.

E. Conclusion

The regional radiation effort is currently low, and this effort is not expected to grow significantly. The function of the office is regulatory, although technical assistance is provided on an "as needed" and "as resources are available" basis. In keeping with regional office tenets, more and more responsibility for monitoring and enforcement will be assumed by state and local authorities. Emergency response planning and EIS review will become increasingly important activities with proliferating usage of radioactive materials. Only limited growth (5-10%)

is expected in the near future (5 years), but, by 1985, career opportunities in nuclear fields may show a rapid increase. As previously noted, career potential will depend on the extent to which radioactive materials become a part of daily life.

VI. SOLID WASTE

A. Workforce Profile

The waste management section is located within the Hazardous Materials Branch of the Air and Hazardous Materials Division. Regional solid waste activities include updating state profiles, reviewing legislation and regulations, program activities and resources, and reviewing a state-developed program strategy. In addition to the foregoing, the solid waste program effort provides technical assistance on assessments of federal facilities for compliance with pollution control requirements. Program activities further include evaluating technical aspects of control agency programs, planning and research grant applitions, and proposed service contracts.

Currently, the waste management section is staffed by three engineers and a clerical position. However, passage of the Resource Conservation and Recovery Act of 1976 (RCRA) will expand and intensify its effort as will implementing certain provisions of the Toxic Substances Control Act as it pertains to disposal. Under provisions of the former, federal facilities will become demonstration sites for volume reduction and resource recovery activities.

Under Subtitle C of the RCRA legislation, a hazardous waste permitting program will be required. The states will eventually administer their own programs but, until such time as they demonstrate competency, considerable assistance will be necessary from the regional program. If the states cannot achieve primacy, then responsibility for implementation will fall to the regional office.

Subtitle D (RCRA) requires development of state solid waste management plans. No new open dumps will be permitted and all other disposal sites must be upgraded or closed. These plans must further include strategies for resource conservation or recovery and for disposal of discarded materials in sanitary landfills.

All of the above activities will require additional technical assistance for the states and will necessitate staff expansion. Because of the nature of the activities required by the legislation, the anticipated positions will be for engineers and scientists.

B. Workforce Projections

As indicated in the preceding section, the new legislation, particularly the Resource Conservation and Recovery Act, will have significant impact on the staffing configuration of the waste management section. The anticipated staff growth is projected to take place in 1978, based on the 18 month implementation constraint set by Congress. However, the extent of the following growth will still be a corollary of congressional appropriations.

TABLE XII

Region VII
Workforce Projections to 1982 (est.) for
Waste Management Section

Position	1976	1977	1978	1979	1980	1981	%/annum growth (average)
Engineer	3	8	16	16	16	16	*n/a
Scientist	0	5	10	10	10	10	n/a
Attorney	0	0	1	1	1	1	n/a
Other	1	2	5	5	5	5	n/a
TOTAL	4	15	32	32	32	32	

*Not applicable inasmuch as after 1978 no positions are expected to be added.

After a dramatic growth from 4 to 32 positions anticipated to be necessary for implementation of the RCRA, no growth is projected. In fact, as the states take over administration of their programs, the regional program may well lose some of its positions. In any event, the positions projected to be added will be for degreed engineers and scientists. The engineering positions will be for chemical, civil sanitary engineers, and the scientists will be from the natural and physical science disciplines.

C. Training and Certification

As in the preceding program areas, new staff members take part in agency orientation and informal OJT with their on-line counterpart. Professional enrichment programs are available through EPA, other job related federal agencies, and professional association workshops and seminars. However, constrained travel budgets inhibit extra-agency training participation, despite the fact that specialist technical training is becoming more and more important to solid waste activities. Such training was formerly available through EPA's Solid Waste Training Academy, but the academy was closed a few years ago because of shifting training emphasis.

The waste management office has been quite active in providing training to state and local authorities. The offerings in 1976 represent a considerable effort for a limited (3) staff capability.

Program/Workshop	Length (days)	Attendance
Solid Waste Management	2	135
Ames (Iowa) Resource Recovery Facility Seminar	1	20

	Length	Attendance
Solid Waste Management Conference	2	70
Solid Waste Management in "208" Planning	2	50
Solid Waste Collection	2	25
TOTAL	9	300

While these programs reached 300 people in the Region VII area, it is clear that more training could have been offered. It is also clear that the new solid waste and toxic substances legislation will require stepped-up program offerings. Necessarily, the regional solid waste staff will require additional resources. Headquarters appears to be tacitly reducing its direct training activitiy by charging user fees, reducing course offerings and relegating more responsibility to the regional offices.

D. Career Potential

At the regional level, some positions for engineers and degreed individuals with backgrounds in biological sciences will likely emerge over the next two years. These positions are projected to be available as a consequence of the new RCRA and toxic substances legislation. Thereafter, no positions are expected to be added. Again, it seems a likelihood that these pieces of legislation will require considerable staff effort for planning, implementation, and maintenance of solid waste management systems. However, the bulk of the positions will be at the state and local level. The dilemma will occur when the states examine closely the cost of implementing the legislation and weigh it

against program cost and short- and long-term benefit. Certainly, positions for engineers, scientists, and technicians will become available as solid waste management moves toward the complex systems technology soon to be necessary for collection and disposal.

E. Conclusion

The Resource Conservation and Recovery Act will be the prime mover in the solid waste field. The regional office expects to grow from a staff of 4 to 32 as a consequence of the mandates of the Act. A similar though less significant impact is expected within states on both the public and private sector. The Act is so comprehensive and wide-reaching that it is likely that implementation patterns will follow those of the air and water legislation. The preceding suggests that the regional office will assume and maintain, for an extended period of time, the majority of program activities because the states will simply not be able to afford accepting primacy.

The Act will probably ultimately generate a significant number of jobs at all skill levels in both the public and private sectors. Systems engineers, complex equipment operators, administrators, computer specialists, and materials analysts are among the disciplines which will be needed to complement the people already on-line.

VII. WASTEWATER

A. Workforce Profile

Responsibility for operating regional water programs is vested with the Water Division. In this capacity, the Division recommends to the Regional Administrator priorities and objectives for meeting national program mandates. More specifically, the Division assists the states with promulgation of programs and strategies which will conform to national mandates. According to the Region VII Organization and Functions document, their activities include operating a municipal wastewater systems program, e.g., review of facility plans and specifications. Program staff also monitors the construction program, conducts construction grants and other specific grant programs such as designated 208 grants and IGA, coordinates areawide planning and other water quality planning activities, and develops control strategies for non-point source discharges.

Further program activity includes reviewing, analyzing, and developing state water quality standards revisions pursuant to Section 303 of PL 92-500. This effort mandates provision of technical assistance to the states and coordination with field and laboratory staff in the Surveillance and Analysis Division and the NPDES permit compliance program in the Enforcement Division. Division staff also determine and implement federal requirements regarding sanitation devices (Section 312) and assist the states with developing information required under Section 305b, e.g., point source pollution inventory. The Division is additionally responsible for the water supply program, specifically, the standards set forth by the Safe

Drinking Water Act, (re: Potable Water).

According to the regional performance report for FY 1976, Region VII made notable progress in achieving water program goals, both at the federal and state levels. However, considerable effort will still be needed in all sectors to meet the standards set forth by legislation. Some milestones reached are as follows: Iowa has enabled their Department of Environmental Quality to assume responsibility for issuing NPDES permits; forty-three 303(e) basin plans have been submitted and 27 approved with the remainder due for approval during FY '77; sixty-one percent of the regional commitment or $251 million of the municipal construction funds were obligated, which means 851 awards were made or 90% over the planned level; the regional office and the states achieved 85 percent compliance from major dischargers; and, regional and state staffs completed 514 operation and maintenance reviews, or 53 percent more than the planned commitment.

Currently, the Water Division is composed of three branches: Engineering; Grants Administration; and Water Quality Planning. The composite staffing levels as of 1976 for each of the branches are depicted below

TABLE XIII

Current (1976) Region VII
Water Division
Engineering Branch
Staffing Level

Position	1976
Engineer	21
Scientist[1]	2
Other[2]	5
TOTAL	28

[1]Economist, sanitarian
[2]Clerical

TABLE XIII (continued)

Water Division
Grants Administration Branch

Position	1976
Grants Specialist[1]	4
Grants Assistant[2]	5
Grants Clerk[3]	7
Other	5
TOTAL	21

[1]Degreed position

[2]May not be degreed

[3]Include administrative office

Water Quality Planning Branch

Position	1976
Engineer	3
Community Planner	3
Other	3
TOTAL	9

Immediate Office[1]

Position	1976
Engineer	4
Scientist[2]	6
Other[3]	3
TOTAL	13

[1]This includes administrative, water supply and water quality standards offices.

[2]Water quality specialists, degreed in sciences

[3]Clerical

GRAND TOTAL 71

As has been previously indicated, other divisions have program staff with responsibility for water programs. The staffing complements represent activities in both potable and wastewater as well as land and air areas.

TABLE XIV

Current (1976) Region VII
Staffing Level for
Surveillance and Analysis Division
Water Section
Laboratory Branch

Position	1976	
Chemists	19	
TOTAL		19

Water Section

Position	1976	
Engineer	5	
Scientist[1]	3	
Technician	4	
Other[2]	3	
TOTAL		15

[1]Biologist, hydrologist, chemist
[2]Clerical

Enforcement Division
Water Programs
(Enforcement)

Position	1976	
Attorney	4	
Other[1]	6	
TOTAL		10

[1]Clerical

TABLE XIV (Continued)

(Permit Programs)

Position	1976
Engineer	4
Scientist[1]	5
Other[2]	9
TOTAL	18
GRAND TOTAL	62

[1]Microbiologist; 2 aquatic biologists; 1 chemist; 1 physical scientist

[2]clerical

Excluding the laboratory, then, which is active in all programs, the Region VII water programs have a total of 114 positions. This total does not account for student aides, participation by other divisions, or authorized but presently vacant positions. The workforce, by position only, represents about forty (40) percent of the total regional complement, which well illustrates the regional commitment to water programs.

Briefly, the operating structure and responsibilities of the three branches are as follows, (these descriptions were excerpted from the Organization and Functions document):

> Engineering: This branch consists of four state sections which have responsibility for facilities planning and development aspects of the municipal wastewater treatment program.
>
> Grants Administration: This branch carries out administrative reviews of construction grants for air and water pollution control grants, Section 208 planning grants, training grants, and 206 reimbursement grant applications. It also provides administrative and technical processing of federal environmental pollution program construction grants and other specific grant funds to state and local agencies.
>
> Water Quality Planning: This branch serves as a focal point for all water quality, water resource, and interagency planning activities for the region. It coordinates activities with all water programs, both in the Water Division and the Surveillance and Analysis and Enforcement Divisions. It further serves as liaison with federal, state, and local planning agencies, especially water programs.

B. Workforce Projections

Division officials anticipate no significant program growth over the five year period. However, this assertion considers that the states will assume the bulk of responsibilities mandated by federal legislation, e.g., PL 92-500 and PL 93-523. Conversely, if the four states are unable to assume primacy for meeting water standards, then the figures represented by the following may exhibit substantially greater growth dictated by regional assumption of state program activity. In all likelihood, the states will be slow to accept full primacy due to the reluctance of state legislatures to place additional fiscal burdens on their citizenry. Political indicators suggest that accepting and achieving program primacy will be gradual as law makers attempt to spread the eventual but certain commitment over the longest possible time period. Thus, it appears that the regional workload needed to meet program deadlines will not abate before FY '79.

The ensuing workforce projections do not consider the foregoing state situation, but rather are a function of the premise that the states will accept, albeit gradually, the legislative mandates. It should be pointed out that the following table is a composite of the three branches of the Water Division and does not include the other Divisions with water positions. There may also be some minor position discrepancies occasioned by interdepartmental transfers of personnel.

TABLE XV

Region VII
Workforce Projections to 1982 (est.) for
Water Division
Engineering, Grants Administration, Water
Quality Planning, Immediate Office

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	28	41	52	56	60	63	n/a[1]	19%
Scientist	8	8	8	8	8	8		0
Grant Specialist	5	11	11	11	11	11		n/a
Technician[2]	5	12	16	17	21	22		n/a
Planner	3	6	7	9	9	9		n/a
Other[3]	22	35	40	44	47	51		20%
TOTAL	71	113	134	145	156	164	n/a	20%

[1] n/a not applicable or non-representative of real growth
[2] Includes grants specialist
[3] Includes grants clerks, steno, secretarial

The preceding demonstrates a marked growth during the 1976 through 1978 period, particularly engineers. Some technicians and engineer positions are used to conduct needs surveys on a biannual basis. In these situations the positions may be temporary and are usually contracted. After 1978, at which time the majority of programs are expected to be operational, any staff growth will represent the biannual survey and program inspection and maintenance activities. During this period of time, the turnover rate will probably fall somewhere between five and ten percent.

C. Training and Certification

In-house training for new hires at the professional and technical levels is generally accomplished through informal OJT experiences with

on-line professionals. All program staff are encouraged to take part in EPA sponsored workshops and seminars as they may be available. Local colleges and universities also offer job related courses or programs leading to degrees or advanced degrees for interested staff members.

In keeping with its mission of providing technical assistance to the states under its purview, the Division has and will continue to offer short courses as resources permit. Past and current offerings may include:

Trouble Shooting for Performance Upgrading of Municipal Wastewater Treatment Plants;

Orientation to Wastewater Treatment Plants;

Orientation to Wastewater Treatment Operation;

Water Quality and Pollutant Source Monitoring: Field and Laboratory Procedures;

Water Quality and Pollutant Source Monitoring: Planning and Administrative Activities; and,

Biological Treatment Technology.

Average attendance for these and similar 3 to 4 day courses ranges from 25 to 35. Most recently the regional manpower office hosted a three-day seminar in Kansas City on small municipal treatment plant operation. The sponsors estimated that as many as three hundred people would attend.

A wide variety of training materials have been and are available from the training center in Cincinnati. This center continues to be a leader in researching and developing water quality training materials, but its location and the costs associated with utilizing its resources prevent optimum use of its extensive and modern facilities.

D. Career Potential

Some general growth is anticipated for permanent positions, about five percent. A few temporary positions will be available as a consequence of the biannual need to conduct surveys. The overall picture is one where engineers and highly trained technicians will have the best potential for employment. Program planners and writers will also have some potential for employment. Otherwise, the situation will be one in which turnover will be, in most cases, replaced. No new or unique skills or training are forecast; however, the limited recruiting activity will be for engineers, scientists, and technicians who have demonstrated proficiency in management, data analysis, and writing in addition to their speciality.

E. Conclusion

The primary concern of the Division is for assisting the states in meeting the standards promulgated by PL 92-500 and 93-523. To these ends, the focus of program activity will be to provide such necessary and appropriate assistance and advice which will assure that the four states will achieve and maintain the water quality standards set forth by federal legislation. The degree of federal involvement will continue to pose resource allocation problems to program officials since the speed with which established goals and deadlines are met will depend, in large part, on the legislative action of the states. If the states do not move to accept primacy, the burden for program operation will continue to be with the regional office. On the other hand, if the states do act to enable primary assumption of the laws, then the regional effort can be modified to monitor and assure maintenance of compliance standards. It is in this

latter capacity that the regional program wishes to act. But, the final decision will be with the state unless new and more stringent measures for the control of water quality are forthcoming.

SUMMARY

The Environmental Protection Agency's Region VII office located in Kansas City, Missouri, provides important enforcement, regulatory and technical assistance services to its four-state area. While workforce needs are difficult to determine in many instances, Region VII officials have recently taken steps to improve internal program and management operations; as a result, more efficient use will be made of all workforce resources at all government levels.

Strong efforts in the construction grants program and in the implementation of the NPDES program have surpassed similar activities in most other federal regions. Continued emphasis must, however, be palced on having states keep pace with federal environmental legislation. As the states assume authorities originally intended for them, the Regional office can channel more of its effort into enforcement and assistance needs.

The air pollution control programs for Region VII anticipate an approximate 10% per year staffing growth over the next five years. There are presently 34 staff positions and 56 are projected by 1981; these projections take into account expected enforcement activity in any Clean Air Act amendments. It is felt that greater growth is likely to be at the state and local levels if fiscal constraints can be overcome.

A single mechanical engineer coordinates all noise program activities for the Region VII office. Two more professionals are expected to be added over the next two years. Because of limited

budgets, most activity will involve assistance to state and local agencies in developing noise ordinances and regulations.

Enforcement, monitoring, and evaluation of pesticide information are among the tasks of the Pesticides Program Branch. This area is extremely important because all four states in Region VII are predominantly agricultural. A staff of 17, mostly scientists, carries out most program functions. Little growth is expected over the next five years even though pesticide registration and applicator certification will require large amounts of personnel. A toxic substances control program is likely to require the addition of ten persons by 1978. Limited growth with greater responsibilities may hamper the pesticides program in the years ahead.

The Region VII potable water program has had a comparitively small staff but may expect some growth as various states attempt to assume primacy under the Safe Drinking Water Act. Growth in enforcement personnel will result if the states assume primacy, but technical personnel will be needed if primacy is not attained. The number of water supply engineers is expected to more than double as the total program workforce grows from eight to at least 20 positions by 1981. Similar growth may occur at the state level as mandates of the Act are complied with.

A radiation workforce of only three professionals is expected to grow by only one position over the next five years. While greater use of nuclear power is likely to occur in the Region, radiation is not considered a serious environmental problem.

The Resource Conservation and Recovery Act (RCRA) is expected to result in dramatic growth in Regional solid waste programs. The present

staff of four may grow to 32 as assistance is provided to states in implementing the RCRA and in carrying out planning functions. Chemical, civil and sanitary engineers will fill most positions. Regional officials point out that portions of the Toxic Substances Control Act may require additional waste management personnel.

The three branches of the Region VII Water Division have a workforce of 71 persons, and an additional 62 employees provide laboratory and enforcement support. Thus nearly 40% of the Regional workforce is involved in water quality programs. Continuing legislative mandates may lead to a 20% per year growth rate in the Division, with engineers and technicians required for most positions.

In general, workforce projections in Region VII are geared to new legislative requirements. Operation and enforcement of many programs can be passed on to states only slowly if at all. In some cases, it is likely that budget limitations will not allow projected expansion, and program priorities may need to be re-examined.

Bibliography

Articles and Periodicals

Ardill, John. "Controlling Water From Source to Tap - A New National Strategy," Water and Sewage Works, CXX, No. 1 (January, 1973), p. 56.

Berman, Fred. "Conserving the Future: America's Scrap Processing Industry," Phoenix Quarterly, IV, No. 4 (1973), p. 3.

Billings, Leon G. "The New Water Pollution Control Law," Plant Engineering, XXVII, No. 2 (January 25, 1973), p. 109.

Bragdon, Clifford R. "Municipal Noise Ordinances - 1976," Sound and Vibration (December, 1976), pp. 22-27.

Bureau of National Affairs. Environment Reporter. I-VII. Washington, D.C.: 1977.

Burton, Ian. "The Quality of Environment: A Review," Geographical Review, L, No. 3 (July, 1968), p. 472.

"Chemical Waste Swapping: Promising, but no panacea," Chemical Engineering (July 5, 1976).

Cook, Raymond L. "A New Era in Operation and Maintenance of Wastewater Treatment Plants," Georgia Operator, X, No. 2 (Fall, 1972), p. 12.

Courchaine, C. "A Practical Method for the Sanitarian's Review of Design of Small Public Water-Supply Systems," Ground Water, XI, No. 1 (January-February, 1973), p. 32.

Dajani, Jarir S., et al. "Optimal Designing of Urban Wastewater Collection Networks," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 853.

Dean, T. A. "Calculating OSHA Noise Compliance," Pollution Engineering, V, No. 1 (January, 1973), p. 43.

Dryden, S. L. and Judd, S. H. "Think 'Quiet' From Initial Design to Plant Operation," Oil and Gas, MCMLXXI, No. 8 (February 19, 1973), p. 102.

"Electric Power and Clean Air - Can We Have Both?," Tennessee Valley Perspective, III, No. 4 (Summer, 1973), pp. 18-22.

"EPA Annual Report," Pollution Engineering Magazine, VII, No. 12 (December, 1975), pp. 34-65.

Ganotis, Chris G. and Hopper, Richard E. "The Resource Recovery Industry," Environmental Science and Technology, X (May, 1976), p. 425.

Haag, Fred G. "State Noise Restrictions - 1976," Sound and Vibration (December, 1976), p. 27.

Hale, Samuel, Jr. "Solid Waste Management - Closing the Circle," Secondary Raw Materials, X, No. 12 (December, 1972), p. 86.

Hamilton, William S. "Practical Noise Abatement for a General Aviation Airport," Sound and Vibration (February, 1977), pp. 24-27.

Higdon, Ralph E. "Understanding Reverse Osmosis," American City, XII, No. 87 (December, 1972), p. 55.

Hochheiser, Robert M. "How to Control Noise," Plant Engineering, XXVI, No. 20 (October 5, 1972), p. 90.

Hollowell, Craig D. and McLaughlin, Ralph D. "Instrumentation For Air Pollution Monitoring," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 1011.

Kenaga, Eugene E. "Guidelines for Environmental Study of Pesticides: Determination of Bioconcentration Potential," Residue Reviews, XLIV (1972), p. 73.

Khan, A. N. and Siddiqi, R. H. "Treatment of Waste Water By Biological Discs," Indian Journal of Environmental Health, IV, No. 14 (October, 1972), p. 289.

Kcczkur, Eugene, et al. "Noise Monitoring and a Sociological Survey of the City of Toronto," Air Pollution Control Association Journal, XXIII, No. 2 (February, 1973), p. 105.

Larsen, Ralph I. "An Air Quality Data Analysis System for Interrelating Effects, Standards, and Needed Source Reductions," Air Pollution Control Agency Journal, XXIII, No. 11 (November, 1973), p. 933.

Levy, Steven J. "Pyrolysis of Municipal Solid Waste," Waste Age (October, 1974).

Lingle, Stephen A. "Paper Recycling in the United States," Waste Age (November, 1974).

Meyers, Sheldon. "EPA and Municipal Resource Recovery," NCRR Bulletin, VI, No. 3 (Summer, 1976).

Miller, E. F. "Desalting as a Source of Water Supply," American Water Works Association Journal, LXIV, No. 12 (December, 1972) p. 804.

Miller, Stanton S. "The Business of Air Pollution Control," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 988.

National Center for Resource Recovery. NCRR Update Monthly. VI, No. 2. Washington, D.C.: February, 1977.

Neal, Lawrence A. and Hervig, Roy A. "Mathematical Water Quality Models," Georgia Operator, X, No. 2 (Fall, 1972), p. 21.

O'Keefe, Andrew E. "The Old, the New, and the Future in Air Pollution Instruments," Clean Air, VII, No. 3 (August, 1973) p. 50.

Parken, Gene F. and Dague, Richard R. "Optimal Design of Wastewater Treatment Systems by Enumeration," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 833.

Peterson, Bob. "There's Gold in Your Garbage," Scouting, LXII, No. 7 (October, 1974), pp. 46-48, 84-86.

Ruckelshaus, William D. "Solid Waste Management: An Overview," Public Management (October, 1972).

Rylander, R., et al. "Sonic Boom Effects on Sleep - A Field Experiment on Military and Civilian Populations," Journal of Sound and Vibration, XXIV, No. 1 (1972), p. 41.

"Selected Manufacturers of Equipment to Control Liquid and Solid Hazardous and Toxic Wastes," Pollution Engineering (April, 1976).

Sharpe, Dr. Lois. "What the People Want You to Do with Solid Waste," APWA Reporter, XL, No. 1 (January, 1973), pp. 8-9.

Shippee, Edgar G. "Materials For Noise Absorption," Pollution Engineering, V, No. 1 (January, 1973), p. 37.

Shuster, Kenneth A. "Fuel Conservation in Solid Waste Management," Virginia Town and Country (December, 1974).

Smith, Philip W. "TVA: Making Peace in the Tennessee Valley," The South (May-June, 1976).

Solid Waste Systems. V, No. 5. Los Angeles: Systems Publishing, Inc.. October-November, 1976.

Souci, Gary. "Solid Waste: The New Apocalypse," Audubon, LXXV, No. 1 (January, 1973), p. 114.

Studeny, John. "Waste Paper Recycling: Issues and Answers, Part I," Printing Magazine (December, 1972), p. 50.

Terango, Larry. "The Environmentalists' Concern With Noise-Induced Hearing Loss," Journal of Environmental Health, XXXV, No. 4 (January-February, 1973), p. 350.

Train, Russell E. "The Uses and Abuses of Waste," Compost Science - Journal of Waste Recycling, XVI, No. 3 (May-June, 1975).

"U.S. Finds a Rich Resource: The Nation's Trash Pile," U.S. News & World Report (May 13, 1974), pp. 63-66.

Van Buskirk, R. B. "Can We Get Out of the Pesticide 'Jungle'?," Farm Chemicals and Croplife, CXXXV, No. 12 (December, 1972), p. 42.

Voegtle, John A. and Vilin, Frank J. "A New Concept for Operator Wages," Water Pollution Control Federation Journal, XLV, No. 2 (February, 1973), p. 203.

Walker, Thomas. "Recycling and Solid Waste Management: Economic Compatibility," Secondary Raw Materials, X, No. 12, (December, 1972), p. 88.

Waroff, Deborah. "Recycled Paper," Architectural Design, XLII, No. 11 (1972), p. 673.

Wood, Frank O. "Selecting Softening Process," American Water Works Association Journal, LXIV, No. 12 (December, 1972), p. 820.

Yerges, Lyle F. "Turn the Noise Down," Oil and Gas, LXXI, No. 2 (January 8, 1973), p. 109.

Zaporozec, Alexander. "Groundwater Zoning in Water Resource Management," Water Resources B, VIII, No. 6 (December, 1972), p. 1137.

Books

A Work Force for Environment and Energy, A Master Plan for Environmental/Energy Higher Education in Illinois. Springfield, Illinois: For the Illinois Board of Higher Education, 1975.

Anthrop, Donald F. Noise Pollution. Lexington, Mass.: Lexington Books, 1973.

Astmann, Robert C. (ed.). Rescuing Man's Environment: Nine Essays on Environmental Reform. Princeton, N.J.: Princeton University Council on Environmental Studies, 1972.

Bakish, Robert. Practice of Desalination. Park Ridge, N.J.: Noyes Data Corp., 1973.

Battan, L. J. The Unclean Sky. Science Study Series. New York: Doubleday Anchor, 1966.

Beatty, Rita Gray. The DDT Myth: Triumph of the Amateurs. New York: John Day Co., 1973.

Behan, R. W. and Weddle, Richard M. (eds.). Ecology, Economics, Environment. Missoula, Montana: University of Montana Press, 1971.

Bloodgood, Don E. Sewage Treatment Practice. Chicago: Scranton Publishing Co., Inc.

Bond, Richard G., et al. (eds.). Air Pollution. Cleveland: CRC Press, 1972.

Bond, Richard G. and Straub, Conrad P. (eds.). CRC Handbook of Environmental Control. Cleveland: CRC Press, 1972.

Brodine, Virginia. Air Pollution. New York: Harcourt Brace Jovanovich, 1973.

Brown, Carl, et al. Decision-Making in Water Resource Allocations. Lexington, Mass.: Lexington Books, 1973.

Carson, John Michael, et al. Community Growth and Water Resources Policy. New York: Praeger Publications, 1973.

Council of State Governments. Our Effluent Society. Lexington, Kentucky: February, 1974.

Council of State Governments. The States' Roles in Solid Waste Management - A Task Force Report. Lexington, Kentucky: April, 1973.

Cross, Frank L., Jr. Corporate Communicators' Guide for Environmental Control. Westport, Conn.: Technomic, 1973.

Cross, Frank L., Jr. and Noble, George. Handbook on Hospital Solid Waste Management. Westport, Conn.: Technomic Publications, 1973.

Cross, Frank L., Jr. Handbook on Incineration: Guide to Theory, Design, Operation, and Maintenance. Westport, Conn.: Technomic Publications, 1972.

Detwyler, Thomas R. (ed.). Man's Impact on Environment. New York: McGraw-Hill, 1971.

Dickey, John W., et al. Technology Assessment: Its Applications to the Solid Waste Management Programs of Urban Government. Lexington, Mass.: Lexington Books, 1973.

Dolgin, Erica L. and Guilbert, Thomas G. P. (eds.). Federal Environmental Law. St. Paul: West Publishing Co., 1974.

Dorfman, Robert. Models For Managing Regional Water Quality. Cambridge, Mass.: Harvard University Press, 1973.

Durrenberger, Robert W. Dictionary of Environmental Sciences. Palo Alto, Calif.: National Press Books, 1973.

Eckenfelder, W. W., Jr., and Cecil, L. K. (eds.). Applications of New Concepts in Physical-Chemical Wastewater Treatment. Elmsford, N.Y.: Pergamon Press, 1972.

Edmunds, Stahrl and Letey, John. Environmental Administration. New York: McGraw-Hill, 1973.

Educational Research Council of America. Challenges of Our Time: Technology: Promises and Problems. Boston: Allyn and Bacon, 1972.

Edwards, C.A. (ed.). Environmental Pollution by Pesticides. New York: Plenum Publications, 1973.

Environmental Information Center. The Environmental Regulations Handbook. New York: Environmental Information Center, 1973.

Fahy, Elmore R. Guide to the Packaging of Hazardous Materials and the Legal Requirements of the Regulatory System. New York: McGraw-Hill, 1973.

Fegely, Thomas, et al. Recycling: An Interdisciplinary Approach to Environmental Education. Emmaus, Pa.: Rodale, 1973.

Golueke, C. G. Composting: A Study of the Processes and Its Principles. Emmaus, Pa.: Rodale, Press, 1973.

Goodman, Charles R., et al. (eds.). Environmental Quality and Water Development. San Francisco: W. H. Freeman, 1973.

Graham, Frank, Jr. Since Silent Spring. Greenwich, Conn.: Fawcett Publications, Inc., 1970.

Gunter, John D. and Jameson, William Carl. Solid Waste Management: Economics and Operation. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Hann, Roy W., Jr. Fundamental Aspects of Water Quality Management. Westport, Conn.: Technomic Publications.

Harrison, James D. Environmental Preferences: Relevant Studies for Urban Planning. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Haskell, Elizabeth H. and Price, Victoria S. State Environmental Management: Case Studies of Nine States. New York: Praeger Publications, 1973.

Haveman, Robert H. and Knesse, Allen V. The Economics of Environmental Policy. New York: J. Wiley, 1973.

Hendricks, Charles W., et al. Fresh Water Pollution. New York: MSS Information Corp., 1973.

Hertzendorf, Martin S. Understanding and Controlling Air Pollution. Westport, Conn.: Science Publications, 1972.

Hesketh, Howard E. Understanding and Controlling Air Pollution. Ann Arbor, Mich.: Science Publications, 1972.

Holl, Karl. Water: Examination, Assessment, Conditioning, Chemistry, Bacteriology, Biology. Berlin, N.Y.: De Gruyter, 1972.

Izaak Walton League of America. A Citizen's Guide to Clean Water. Arlington, Va.: June, 1973.

Jukes, Thomas, et al. Effects of DDT on Man and Other Mammals. New York: MSS Information Corp., 1973.

King, Richard L. Airport Noise Pollution: A Bibliography of Its Effects on People and Property. Metuchen, N.J.: Scarecrow Press, 1973.

Klopfer, Peter H. Behavioral Aspects of Ecology. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Lee, Douglas H. K. Environmental Factors in Respiratory Disease. New York: Academic Press, 1972.

Lee, Kaiman (ed.). Bibliography of the Computer in Environmental Design. Boston: Center for Environmental Research, 1972.

Leithe, W. An Analysis of Air Pollutants. Ann Arbor, Mich.: Humphrey Science Publishers, 1970.

Leithe, Wolfgang. The Analysis of Organic Pollutants in Water and Wastewater. Ann Arbor, Mich.: Ann Arbor Scientific Publications, 1973.

Martin, Hubert (ed.). Insecticide and Fungicide Handbook for Crop Protection. Oxford, U.K.: Blackwell Scientific, 1972.

Mitchell, Ralph (ed.). Water Pollution Microbiology. New York: John Wiley and Sons, Inc., 1972.

Morell, Ben. Our Nation's Water Resources: Policies and Politics. New York: Arno Press, 1972.

National Association for Environmental Education. Selected Environmental Education Programs in North American Education. Edited by Arden L. Pratt, 1974.

National Wildlife Federation. Conservation Directory 1977. Edited by Gloria H. Decker. Washington, D.C.: The National Wildlife Federation, 1977.

New York Health Education Service. Manual of Instruction for Sewage Treatment Plant Operators. Albany: New York Health Education Service.

Newell, Frederick Haynes. Water Resources: Present and Future Uses. New York: Arno Press, 1972.

Noll, Kenneth and Duncan, Joseph (eds.). Industrial Air Pollution Control. Ann Arbor, Mich.: Ann Arbor Science Publishers, 1973.

Oliver, Henry. Irrigation and Water Resources Engineering. New York: Crane, Rusak, 1972.

Pazar, C. Air and Gas Cleanup Equipment. 2d ed. Park Ridge, N.J.: Noyes Data Corp., 1972.

Perera, Thomas and Perera, Gretchen. Louder and Louder: The Dangers of Noise Pollution. New York: E. Watts, 1973.

Pettyjohn, Wayne A. Water Quality in a Stressed Environment: Readings in Environmental Hydrology. Minneapolis: Burgess Publications, 1972.

Pursglove, L. A. and Mancy, K. H. Elements of Biological Wastewater Treatment - Overview. Unit I, Part I. Ann Arbor, Mich.: University of Michigan School of Public Health, 1968.

Ranney, David C. Water - Quality Management: An Analysis of Institutional Patterns. Madison: University of Wisconsin Press.

Ranney, M. W. Soundproofing Building Materials. Park Ridge, N.J.: Noyes Data Corp., 1970.

Robinson, D. W. The Relationship Between Hearing Loss and Noise Exposure. Teddington, England: National Physical Laboratory, 1973.

Rodier, Jean. Chemical and Physiochemical Analysis of Water. New York: J. Wiley, 1973.

Roelofs, Robert T., et al. (eds.). Environment and Society: A Book of Readings on Environmental Policy, Attitudes, and Values. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Russell, Helen R. Earth, the Great Recycler. Nashville, Tenn.: Nelson, 1973.

Schildhaver, Carol. Environmental Information Sources: Engineering and Industrial Applications; A Selected and Annotated Bibliography. New York: Special Libraries Association, 1972.

Scorer, Richard Segar. Pollution in the Air: Problems, Policies and Priorities. London, Boston: Routledge and Kegan Paul, 1973.

Shaw, Bill. Environmental Law, People, Pollution and Land Use. St. Paul: West Publishing Co., 1976.

Shepart, Merle (ed.). Insect Pest Management: Readings. New York: MSS Information Corp., 1973.

Sherman, Anthony C. Land and Trash: Our Wounded Land. West Haven, Conn.: Pendulum Press, 1972.

Sherod, H. Floyd (ed.). Environment Law Review. New York: Clark Boardman, 1972.

Spyer, Geoffrey. Architect and Community: Environmental Design in Urban Society. London: Owen, 1971.

Stephan, David L. and Schaffer, Robert B. Waste Treatment and Renovation Status of Process Development. Part 1. Washington, D.C.: Journal of Water Pollution Control Federation, 1970.

Stern, A. C. Air Pollution. Vol. I, II. New York: Academic Press, 1962.

Stern, A. C. (ed.). Air Pollution: A Comprehensive Treatise. Vol. I, II, III. 2d ed. New York: Academic Press, 1968.

Tennessee Energy Office. Tennessee Energy Handbook. Nashville: Tennessee Energy Office, 1975.

Texas Water Utilities Association. Manual of Wastewater Operations. Austin: Texas Water Utilities Association, 1971.

Thibeau, Charles E. Annual Directory of Environmental Information Sources. Boston: Cahners Books, 1972.

Van Tassel, Alfred J. Our Environment: The Outlook for 1980. Lexington, Mass.: Lexington Books, 1973.

Van Valkenburg, Wade (ed.). Pesticide Formulations. New York: M. Dekker, 1973.

Vivian, V. Eugene. Sourcebook for Environmental Education. St. Louis: Mosby, 1973.

Walsbott, George L. Health Effects of Environmental Pollutants. St. Louis: Mosby, 1973.

Water Pollution Control Federation. Manuals of Practice. Washington, D.C.: Water Pollution Control Federation.

Welch, Bruce L., and Welch, Annemarie S. (eds.). Physiological Effects of Noise. New York: Plenum Press, 1970.

Westberg, Karl, et al. The Chemistry of Smog. New York: MSS Information Corp., 1973.

Williamson, Samuel J. Fundamentals of Air Pollution. Reading, Mass.: Wesley Publishers, 1973.

Wilson, David Gordon. The Treatment and Management of Urban Solid Waste. Westport, Conn.: Technomic Publications, 1972.

Public Documents

Citizen's Advisory Committee on Environmental Quality. Report to the President and to the Council on Environmental Quality. Washington, D.C.: December 31, 1975.

Council on Environmental Quality, Federal Interagency Task Force. A Recommended Air Pollution Index. September, 1976.

Council on Environmental Quality. Integrated Pest Management. November, 1972.

Council on Environmental Quality. Environmental Quality. Second Annual Report. August, 1971.

Council on Environmental Quality. Environmental Quality. Fifth Annual Report. December, 1974.

Council on Environmental Quality. Environmental Quality. Sixth Annual Report. December, 1975.

Council on Environmental Quality. Environmental Quality. Seventh Annual Report. September, 1976.

Council on Environmental Quality. OCS Oil and Gas - An Environmental Assessment. April, 1974.

Council on Environmental Quality and Federal Council for Science and Technology. The Role of Ecology in the Federal Government. Washington, D.C.: December, 1974.

U.S. Department of Agriculture. Farmers' Use of Pesticides in 1971... Quantities. Agricultural Report No. 252, July, 1974.

U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. The Pesticide Review - 1974. September, 1975.

U.S. Department of Health, Education and Welfare, Office of Environmental Education (Contract to Kirkwood Community College, Cedar Rapids, Iowa). A Curriculum Report - Integrated Pest Management. 1973.

U.S. Department of Health, Education and Welfare. Report of State and Local Radiological Health Programs. July, 1976.

U.S. Department of the Interior, Federal Water Pollution Control Administration, Great Lakes Region. Clean Water for Mid-America. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Federal Water Quality Administration. Clean Water Quality for the 1970's. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Office of Saline Water Report 779. The Economic Value of Water Quality. Washington, D.C.: U.S. Government Printing Office, January, 1972.

U.S. Department of Labor. "Employment in Nuclear Energy Activities." NEWS. June 28, 1976.

U.S. Department of Labor, Bureau of Labor Statistics. Impact of Federal Pollution Control and Abatement Expenditures on Manpower Requirements. Bulletin No. 1836, 1975.

U.S. Environmental Protection Agency, Office of Water Program Operations. A Classification System for Water and Wastewater Facilities and Personnel, Part 3 - Existing Examination Systems: A Current Status Report, prepared by the Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. April, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. A Drop to Drink - A Report on the Quality of our Drinking Water. June, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. A Nationwide Survey of Resource Recovery Activities, by Richard E. Hopper. A Current Report on Solid Waste Management Series Publication No. 142, March, 1975.

U.S. Environmental Protection Agency, Division of Manpower Training. A Two-Year Water Quality Monitoring Curriculum, prepared by Ulster County Community College, Stone Ridge, New York. September, 1975.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Abatement and Pollution Control Training and Educational Programs Presented by the U.S. EPA - July 1973 - June 1975. 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. About Sound. Washington, D.C.: May, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. An Accounting System for Solid Waste Shredders. A Current Report on Solid Waste Management, Series Publication No. 154, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. An Overview of Pesticide Applicator Certification. February, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Anaerobic Digestion of Solid Waste and Sewage Sludge to Methane. A Current Report on Solid Waste Management, Series Publication No. 159, July, 1975.

U.S. Environmental Protection Agency. Area and Agency Designation Handbook for Section 208 Area-wide Waste Treatment Management Planning. December, 1974

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Basic Issues on Solid Waste Management Affecting County Government, prepared by National Association of Counties. May, 1973.

U.S. Environmental Protection Agency. Beneficial Use of Storm Water. Washington, D.C.: U.S. Government Printing Office, January, 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Building for Clean Water. August, 1975.

U.S. Environmental Protection Agency. "Certification of Pesticide Applicators." Federal Register. Vol. 39, No. 197, October 9, 1974.

U.S. Environmental Protection Agency, Office of Legislation, Public Inquiries Branch. The Challenge of the Environment: A Primer on EPA's Statutory Authority. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air and Your Car. March, 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air the Breath of Life. April, 1976.

U.S. Environmental Protection Agency, Mobile Source Pollution Control Office. Control Strategies for In-Use Vehicles. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Cost Analysis Handbook for Section 208 Areawide Waste Treatment Management Planning Federal Assistance Applications. May, 1975.

U.S. Environmental Protection Agency. DDT - A Review of Scientific and Economic Aspects of the Decision to Ban its Use as a Pesticide. July, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Decision-Makers Guide in Solid Waste Management. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Digest of State Pesticide Use and Application Laws. 1977.

U.S. Environmental Protection Agency. "Effective Hazardous Waste Management (Non-radioactive) Position Statement." Federal Register. Vol. 41, No. 161, August 18, 1976.

U.S. Environmental Protection Agency, Resource Recovery Division. Energy Conservation through Improved Solid Waste Mangement, by Robert A. Lowe. Solid Waste Management Series Publication No. 125, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Energy Recovery from Waste. Solid Waste Management Series Publication No. 36d.ii, 1973.

U.S. Environmental Protection Agency. "EPA Amends Funding Formula for Areawide Planning Grants." Environmental News. October 14, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. EPA Noise Control Program - Progress to Date. May, 1976.

U.S. Environmental Protection Agency. "EPA Seeking Greater Public Involvement in Water Quality Management Programs." Environmental News. October 22, 1976.

U.S. Environmental Protection Agency. "Environmental Radiation Protection Standards for Nuclear Power Operations." Federal Register. Vol. 42, No. 9, January 13, 1977.

U.S. Environmental Protection Agency, Office of Radiation Programs, Joint Study of the Atomic Energy Commission and the Department of Health, Education and Welfare. Estimates of Ionizing Radiation Doses in the United States, 1960 - 2000. Rockville, Md.: August, 1972.

U.S. Environmental Protection Agency, Region IV, Office of Water Programs, Water Supply Branch. Evaluation of the Florida Water Supply Program. Atlanta: 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Everybody's Business - The Resource Conservation and Recovery Act of 1976. February, 1977.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Farmer's Pesticide Use Decisions and Attitudes on Alternate Crop Protection Method. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Financing Solid Waste Management in Small Communities, by Eric R. Zausner. 1971.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. First Report to Congress: Resource Recovery and Source Reduction. 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. First Things First. September, 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. Full Scale Parallel Activated Sludge Process Evaluation. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Goals of the Federal Solid Waste Management Program, by Sheldon Meyers. 1976.

U.S. Environmental Protection Agency. "Grants to State and Designated Areawide Planning Agencies - Conditions, Policies and Procedures." Federal Register. Vol. 40, No. 230, November 28, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide for Compiling a Comprehensive Emission Inventory. Research Triangle Park, N.C.: January, 1972.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide to Research in Air Pollution. Research Triangle Park, N.C.: 1972.

U.S. Environmental Protection Agency. Guidelines for Areawide Waste Treatment Management Planning. August, 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Guidelines for Developing a Training Program in Noise Survey Techniques. July, 1975.

U.S. Environmental Protection Agency, Office of Water and Hazardous Materials. Guidelines for Preparation of Water Quality Management Plans. September, 1974.

U.S. Environmental Protection Agency, Office of Water Programs Operations. Guidance for Preparing a Facility Plan. May, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guidelines for Technical Services of a State Air Pollution Agency. Research Triangle Park, N.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Guidelines to Career Development for Wastewater Treatment Plant Personnel. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Hazardous Wastes. Solid Waste Management Series Publication No. 138, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Hazardous Wastes and their Management. Environmental Information Series, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Health Effects of Air Pollutants. June, 1976.

U.S. Environmental Protection Agency. "Home Study Course on Wastewater Collection Systems." Environmental News. August 26, 1976.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Improving Water Quality Management in Nonmetropolitan Areas. Washington, D.C.: January, 1973.

U.S. Environmental Protection Agency. Incentives for Recycling and Reuse of Plastics - A Summary Report. Solid Waste Management Series Publication No. 41c.1, 1973.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Incremental Cost Impacts of the 1972 Federal Insecticide, Fungicide and Rodenticide Act as Amended. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Intergovernmental Approaches to Solid Waste Management, by Richard O. Toftner and Robert M. Clark. 1971.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Inventory of Interstate Carrier Water Supply Systems. Washington, D.C.: July, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Interior Output Evaluation Handbook for Section 208 Areawide Waste Treatment Management Planning. June, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Land Availability, Crop Production and Fertilizer Requirements in the United States. A Current Report on Solid Waste Management, October, 1975.

U.S. Environmental Protection Agency. Management Agencies Handbook for Section 208 Areawide Waste Treatment Management. September, 1975.

U.S. Environmental Protection Agency. Management of Nonpoint Sources and District Action, by Eckhardt C. Beck. February 3, 1976.

U.S. Environmental Protection Agency. Manpower and Training Needs for Air Pollution Control. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Environmental Protection Agency, Office of Water Program Operations, Manpower Development Staff. Manpower Requirements for Wastewater Collection Systems in Cities and Towns up to 150,000 in Population. June, 1973.

U.S. Environmental Protection Agency. Markets and Technology for Recovering Energy from Solid Waste, by Steven J. Levey. Solid Waste Management Series Publication No. 130, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Market Locations for Recovered Materials. A Current Report on Solid Waste Management Series Publication No. 518, August, 1976.

U.S. Environmental Protection Agency. "Materials Recovery - Solid Waste Management Guidelines for Source Separation." Federal Register. Vol. 40, No. 181, September 17, 1975.

U.S. Environmental Protection Agency and National Institute of Municipal Law Officers. Model Community Noise Control Ordinance. September, 1975.

U.S. Environmental Protection Agency. "National Interim Primary Drinking Water Regulations." Federal Register. Vol. 40, No. 248, December 24, 1975.

U.S. Environmental Protection Agency. No Small Task: Establishing National Effluent Limitations Guidelines and Standards. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Around our House. February, 1977.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Control Programs of the Federal Government. July, 1976.

U.S. Environmental Protection Agency, Office of Noise Control and Abatement. Noise Facts Digest. Washington, D.C.: June, 1972.

U.S. Environmental Protection Agency. Noise from Heavy Construction. August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Pollution. September, 1974.

U.S. Environmental Protection Agency. Noise Programs of Professional/ Industrial Organizations, Universities and Colleges. EPA Report NTID300.9. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency. O & M - Making Wastewater Treatment Work in Your Community. May, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Passenger Noise Environments of Enclosed Transportation Systems. June, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Pesticide Registration: How It Protects You, Your Family and the Environment. February, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Portable Air Compressor Noise Emission Standards. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Proceedings 1975 Conference on Waste Reduction. April, 1975.

U.S. Environmental Protection Agency. Progress in the Prevention and Control of Air Pollution in 1974 - Report to Congress. 1975.

U.S. Environmental Protection Agency, Office of Radiation Programs. Radiological Quality of the Environment. May, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Railroad Noise Emission Standard. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Recovering Resources from Solid Waste Using Wet-Processing, by David G. Arella. Solid Waste Management Series Publication No. 47d, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Recycling and the Consumer. Solid Waste Management Series Publication No. 117, 1974.

U.S. Environmental Protection Agency, Region I. Regional Administrator's Annual Report - Environmental Quality in New England. Boston: August, 1975.

U.S. Environmental Protection Agency. Relationship Between Animal Wastes and Water Quality. Washington, D.C.: EPA Publications Branch, June, 1972.

U.S. Environmental Protection Agency. "Residential, Commercial and Institutional Solid Wastes - Proposed Guidelines for Storage and Collection." Federal Register. Vol. 40, No. 134, July 11, 1975.

U.S. Environmental Protection Agency. Residential Paper Recovery: A Municipal Implementation Guide, by Penelope Hansen. 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery and Land Protection: An Environmental Imperative, by Arsen J. Darnay, Jr. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Financing, by Robert E. Randol. Solid Waste Management Series Publication No. 157.4, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Further Assistance, by Denise Hawkins. Solid Waste Management Series Publication No. 157.8, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. San Diego County Demonstrates Pyrolosis of Solid Waste, by Steven J. Levy. Solid Waste Management Series Publication No. 80d.2, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Separating Paper at the Waste Source for Recycling, by Stephen Lingle. Solid Waste Management Series Publication No. 128, 1974.

U.S. Environmental Protection Agency. The Social Impact of Noise. EPA Report NTID300.11. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency, Office of Public Affairs, Public Inquiries Branch. Solid Waste Management: A List of Available Literature. Washington, D.C.: January, 1972.

U.S. Environmental Protection Agency. Solid Waste Management: Abstracts from the Literature, 1968. EPA Report SW-66.4c. Washington, D.C.: U.S. Government Printing Office, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Solid Waste Management: Available Information Materials. Washington, D.C.: November, 1975.

U.S. Environmental Protection Agency. "Solid Waste Management - Guidelines for Beverage Containers." Federal Register. Vol. 40, No. 220, November 13, 1975.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Standards for Certification of Pesticide Applicators. October, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. State and Municipal Noise Control Activities 1973 - 1974. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Program Implementation Guide: Hazardous Waste Transportation Control. A Current Report on Solid Waste Management, Series Publication No. 512, March, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Solid Waste Management Agencies. March, 1976.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 1: Estimate of State Water Pollution Control Agency Manpower Needs. November, 1975.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 2. November, 1975.

U.S. Environmental Protection Agency, Library Systems Branch. Summaries of Foreigh Governments Environmental Reports. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Summaries of Solid Waste Intramural Research and Development Projects, by Andrew W. Breidenbach. 1971

U.S. Environmental Protection Agency, Office of Water Programs. Surface Pollution Problems in the United States. Washington, D.C.: May, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. The Benefit-Cost Relationship in Entry Job Training in Water Distribution. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. The Demonstration of Systems for Recovering Materials and Energy from Solid Waste, by John H. Skinner. 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. The Quality of Life Concept - An Anthology from 1972 EPA Symposium. Washington, D.C.: August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Toward Cleaner Water - The New Permit Program to Control Water Pollution. 1974.

U.S. Environmental Protection Agency, Office of Water Supply. Training Strategy. October 21, 1976.

U.S. Environmental Protection Agency, Office of Research and Development. Who's Who II in the Interagency Energy/Environment R & D Program. October, 1976.

U.S. Environmental Protection Agency. Work Plan Handbook for Section 208 Areawide Waste Treatment Management Planning. February, 1975.

U.S. Environmental Protection Agency. "Worker Protection Standards for Agricultural Pesticides." Federal Register. Vol. 39, No. 92, May 10, 1974.

U.S. Federal Energy Administration. Careers in Energy Industries. 1975.

U.S. Federal Energy Administration. Directory of State Government Energy-Related Agencies. September, 1975.

U.S. Federal Energy Administration, National Energy Information Center. Review and Evaluation: Presidential Task Force on Power Plant Acceleration. August, 1976.

U.S. Federal Energy Administration. Project Independence Blueprint Final Task Force Report: Labor Report. Washington, D.C.: November, 1974.

U.S. Federal Energy Administration, Presidential Task Force on Power Plant Acceleration. Status Significant U.S. Power Plants In Planning or Under Construction. July 1, 1976.

U.S. Federal Power Commission. Federal Power Commission 1975 Annual Report. 1975.

U.S. Federal Power Commission. The Federal Power Commission: What it is and What it Does. Washington, D.C.: 1977.

U.S. Nuclear Regulatory Commission. Construction Status Report - Nuclear Power Plants - Data for Decisions. December, 1976.

U.S. Nuclear Regulatory Commission. Operating Units Status Report - Licensed Operating Reactors - Data for Decisions. March, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Air Pollution Control Program - 1975 Annual Report. July, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Pesticide Control Program. January, 1977.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Report on Water Quality, Virgin Islands, U.S. of A. 1970 - 1975. June, 1975.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs. Virgin Islands Territorial Plan for Certification of Commercial and Private Applicators of Restricted Use Pesticides. Febraury, 1976.

U.S. Virgin Islands, Department of Health, Division of Environmental Health. Air Quality Control Implementation Plan for the U.S. Virgin Islands. 1972.

Reports

Alabama Department of Public Health, Environmental Health Administration, Division of Public Water Supplies. Evaluation of the Semi Public Water Supplies in Alabama. Montgomery: Alabama Water Improvement Commission, 1975.

Alabama Water Improvement Commission. 1973-1974 Biennial Report. 1974.

American Chemical Society. Solid Wastes - An Environmental Science and Technology Reprint Book. Washington, D.C.: American Chemical Society, 1971.

American Iron and Steel Institute. Summary Report of Solid Waste Processing Facilities. Washington, D.C.

American Public Health Association. Public Exposure to Ionizing Radiations. New York: American Public Health Association, 1958.

American Society of Civil Engineers. Ground Water Management. New York: American Society of Civil Engineers, 1972.

American Society for Testing and Materials. Biological Methods For the Assessment of Water Quality. Symposium Proceedings. Philadelphia: American Society for Testing and Materials, 1973.

Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. Roles and Responsibilities for Developing a Comprehensive State Water and Wastewater Operator Training Program. Prepared for the U.S. Environmental Protection Agency, Office of Water Program Operations. July, 1976.

Atlanta Regional Commission. Chattahoochee Corridor Study. Atlanta: July, 1976.

Atlanta Regional Commission. Possibilities for Water Conservation in the Atlanta Region. Atlanta: March, 1976.

Baker, Robert A. Taste and Odor in Water: A Critical Review. Manufacturing Chemists Association Report F-A233. May, 1967.

Blair, Louis H. and Schwartz, Alfred I. How Clean is Our City? A Guide for Measuring the Effectiveness of Solid Waste Collection Activities. Washington, D.C.: Urban Institute, 1972.

Bloom, Sandra C. and Degler, Stanley E. Pesticides and Pollution. Washington, D.C.: Bureau of National Affairs, 1969.

Boyd, Eldon M. Protein Deficiency and Pesticide Toxicity. Springfield. Ill.: Thomas, 1972.

Burke, Jacqueline M. and Fisher, Westin A. The Realities of Recycling. Minneapolis: Minnesota Pollution Control Agency, 1973.

Committee on Boundary Noise. The Regulation of Steady-State Noise Sources at Boundaries in Municipalities of North Carolina. North Carolina: September, 1973.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Progress Report on Recycling. Washington, D.C.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Restrictive Container Legislation. Washington, D.C.: March, 1976.

Cornell, Howland, Hayes, Merryfield, Clair A. Hill and Associates. Wastewater Treatment Plant Staffing Guidelines. Prepared for U.S. Environmental Protection Agency. October, 1972.

Coughlin, R. W. Air Pollution and Its Control. New York: American Institute of Chemical Engineers, 1972.

Dasmann, Raymond F., et al. Ecological Principals for Economic Development. Prepared for the International Union for Conservation of Nature and Natural Resources, and the Conservation Foundation. New York: J. Wiley, 1973.

Degler, Stanley E. and Bloom, Sandra C. (eds.). Federal Pollution Control Programs: Water, Air, and Solid Wastes. Washington, D.C.: Bureau of National Affairs, 1969.

Frost, and Sullivan, Inc. The Solid Waste Control Market. Report 141. May, 1972.

Gendel, Eugene B., et al. Manpower Analysis: Municipal Wastewater Treatment Facilities in New England. Prepared for U.S. Environmental Protection Agency. October, 1972.

Georgia State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators. Water and Wastewater Operator Certification in Georgia - Progress Report, July 1, 1975 - June 30, 1976. Atlanta, 1976.

Goldstein, E., et al. Air Pollution and Methods of Control. New York: MSS Information Corp., 1973.

Gould, Robert F. (ed.). Organic Pesticides in the Environment. Washington, D.C.: American Chemical Society, 1966.

Groman, William A. Forest Fertilization. Prepared for U.S. Environmental Protection Agency. Washington, D.C.: August, 1972

League of Women Voters Education Fund. Municipal Sludge: What Shall We Do With It? Current Focus Series Publication No. 627. 1976.

League of Women Voters Education Fund. Recycle - In Search of New Policies for Resource Recovery. Publication No. 132. Washington, D.C.: 1972.

League of Women Voters Education Fund. Solid Waste - It Won't Go Away. Current Focus Series Publication No. 675. April, 1971.

League of Women Voters Education Fund. Solid Waste Management: The National Issues. Community Guide Series Publication No. 134. 1972.

League of Women Voters of the United States. Study of Solid Waste Management. Community Guide Series Publication No. 699. November, 1971.

Lee, Lester. Smog: A Report to the People. Pasadena: California Institute of Technology, 1972.

Mackinney, H. W. Disposal of Plastics With Minimum Environmental Impact. American Society For Testing and Materials Special Publication 533. Philadelphia: 1973.

McClellan Air Force Base. Interim Report on Pilot Programs for Pesticide Monitoring of Water on Air Force Bases. National Technical Information Service Report AD-751 894. December, 1969.

Moreau, David H., et al. Regional Water Resource Planning For Urban Needs. Raleigh: Water Resources Research Institute of the University of North Carolina, 1973.

National Academy of Sciences. Report on Motor Vehicle Emissions to the EPA. Washington, D.C.: National Academy of Sciences, 1973.

National Association for Environmental Education. Current Issues in Environmental Education-1975: Selected Papers From the Fourth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1975.

National Association for Environmental Education. Current Issues in Environmental Education - II: Selected Papers from the Fifth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1976.

National Center for Resource Recovery. Putting Solid Waste and Resource Recovery in Perspective. Washington, D.C.: 1976.

National Field Research Center, Inc. An Environmental Manpower Projection Study. 7 Volumes. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Field Research Center, Inc. State of Illinois, Environmental/Energy Education in the Pubic Community College System. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Planning Association. The Demand for Scientific and Technical Manpower in Selected Energy-Related Industries, 1970-1985: A Methodology Applied to a Selected Scenario of Energy Output. A Summary.

North Carolina Agricultural Extension Service. North Carolina Pesticide Training Manual. September, 1973.

North Carolina Water Resources Research Institute. The Effects of Sewer Surcharges on the Level of Industrial Wastes and the Use of Water By Industry. National Technical Information Report PB-213 267/8. August, 1972.

Olympus Research Corporation. Manpower Planning for Wastewater Treatment Plants. Prepared for the U.S. Environmental Protection Agency, Office of Water Programs.

Patterson, W. L. and Banker, R. F. Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities. Prepared for the U.S. Environmental Protection Agency, Office of Research and Monitoring. October, 1971.

South Carolina Department of Education. Environmental Education: A Source Book for Educators. Columbia: South Carolina Department of Education, 1976.

Southwest Georgia Planning and Development Commission. Energy Management and Conservation in the 14-County Southwest Georgia APDC. Camilla: January, 1976.

Spindletop Research, Inc. Economic Situation Issues Description: Coal Mining. Prepared for the Kentucky Development Cabinet. June, 1974.

Spindletop Research, Inc. Kentucky's Coal Manpower: An Updated Assessment of Needs and Availability for Increased Production through 1985. Prepared for the Kentucky Development Cabinet. December, 1974.

Stern, Carlos, et al. Impacts of Beverage Container Legislation on Connecticut and a Review of the Experience in Oregon, Vermont and Washington State. Report to the Connecticut State Legislature, Department of Environmental Protection, by members of the University of Connecticut Department of Agricultural Economics. March 12, 1975.

Tennessee Valley Authority. 76 Annual Power Report. Knoxville: Tennessee Valley Authority, 1976.

Tennessee Valley Authority. TVA 75 Annual Report. Knoxville: Tennessee Valley Authority, 1975.

Virginia Polytechnic Institute and State University. Improving Water Quality by Removal of Pesticide Pollutants with Aquatic Plants. National Technical Information Service Report PB-495/6. August, 1972.

Young, Dennis. How Shall We Collect the Garbage? A Study in Economic Organization. Washington, D.C.: Urban Institute, 1972.

Zinger, Clem L., et al. Environmental Volunteers in America: Findings and Recommendations of the Steering Committee of the National Center For Voluntary Action (NCVA) Environmental Project. Washington, D.C.: National Center For Voluntary Action, 1973.

Unpublished Material

Agee, James L. Remarks before the Association of American Pesticide Control Officials, Inc. Washington, D.C.: April 7, 1975.

American Chemical Society. Photochemical Smog and Ozone Reactions. Conference Proceedings. Washington D.C.: American Chemical Society, 1972.

Baylay, Dr. Ned T. Management Decisions Regarding Farm Chemicals. Paper presented at 1971 National Agricultural Outlook Conference. Washington, D.C.: U.S. Department of Agriculture, 1971.

Cairns, John, Jr. and Dickson, K. L. (eds.). Biological Methods for the Assessment of Water Quality. Symposium proceedings of the American Society for Testing and Materials. Philadelphia: American Society for Testing and Materials, 1973.

Sopper, William E. and Kardos, Louis T. (eds.). Recycling Treated Municipal Wastewater and Sludge Through Forest and Cropland. Symposium proceedings, Pennsylvania State University. University Park: Pennsylvania State University, 1973.